INDUSTRIAL MEDICINE AND SURGERY

Volume 24 FEBRUARY 1955 Number 2

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INDUSTRIAL MEDICINE AND SURGERY

The Journal of Medicine in Industry

This Journal is dedicated to the advancement of sound industrial medicine, including the surgery of industrial trauma. To that end its varying contents will embrace scientific papers, reports, digests, news items and official statements, together with editorial comment. The editorial policy is to avoid undue censorship. Some contributions ably prepared will be published although contravening the personal opinions of the editors. Care will be exercised in checking the accuracy of known facts, as printed, but in all other respects statements and opinions are those of the author and may not be shared by the editors. On any article, the editors reserve the right to comment favorably or otherwise, in the current or any subsequent issue. On this basis, contributions are invited. The opinions expressed in any contributions, including the editorials of this Journal, do not necessarily reflect the attitude or opinions of any associated organization.

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Personal

L. EDGAR BOSTIAN, M.D., joined the General Electric Evendale Plant Medical Staff on November 1, 1953, as a full-time industrial psychiatrist. DR. BOSTIAN graduated from Marquette University Medical School in 1949, and continued his training at Milwaukee County Hospital, Henry Ford Hospital, and Milwaukee Sanitarium. His work will include diagnostic examination and evaluation of individuals believed to have emotional difficulties of some type. Such persons come to the attention of the Medical Department for many reasons, ranging from absenteeism, alcoholism, or inability to get along with fellow workers, to the more obvious disabilities of the hypochondriac. The aim of the program in which DR. BOSTIAN is to be engaged will be to evaluate the feasibility of rehabilitation of such individuals, attempt briefly to motivate them if necessary, and then make known to them the facilities in the community for rehabilitation. The program will be coordinated with efforts of the supervisory personnel to deal more effectively with the maladjusted individual.

LE ROY H. SLOAN, M.D., has been elected President of the Institute of Medicine of Chicago for 1955. Other officers are: ROBERT W. KEETON, M.D., Vice-President; GEORGE H. COLEMAN, M.D., Secretary; E. LEE STROHL, M.D., Treasurer; HENRY T. RICKETTS, M.D., Chairman of the Board.

EARLE A. IRVIN, M.D., Medical Director, Ford Motor Company, Dearborn, Michigan, addressed a "Heart in Industry Conference" at the Morrison Hotel, Chicago, January 12, 1955. His subject was "Characteristics of a Good Industrial Medical Program."

ATLANTA, Georgia is planning the organization of an Industrial Health Council, following the pattern of the Council established at Birmingham, Alabama, seven years ago ("The Birmingham Plan," *Indust. Med. & Surg.*, 22:6, 237 (June), 1953.)

STANLEY E. TELSER, M.D., is Medical Director of the new AFL International Ladies' Garment Workers' Chicago Health Center,

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Component Society of the Industrial Medical Association.

recently inaugurated at 15 South Wacker Drive. The Center was established and equipped and will be operated and maintained by contributions from 215 garment companies. DR. TELSER'S staff will be composed of 20 part-time physicians, two full-time nurses, two x-ray and three laboratory technicians, and an office staff of three.

A NEW and permanent Committee on Industrial Health has been appointed by the State Medical Society of Wisconsin to function as a part of the Council on Medical Services. Announcement of the appointment was made by DR. D. E. DORCHESTER, Sturgeon Bay, Chairman of the Council. DR. DORCHESTER will serve as a member of the Committee. Other members are: DRS. E. L. BELKNAP, Milwaukee; T. S. BURDON, Green Bay; J. V. FLANNERY, Wausau; D. N. GOLDSTEIN, Kenosha; G. P. GREDLER, Janesville; G. W. PETERSEN, Neenah; D. M. RUCH, Milwaukee; J. M. WILKIE, Madison; and R. S. WRIGHT, Racine. DR. BELKNAP was named Chairman of the Committee when it held its first meeting December 11 in Milwaukee. Also attending the meeting were HARRY NELSON, of the Wisconsin Industrial Commission, and MISS CATHERINE CHAMBERS and WILLIAM LEA, Ph.D., from the Industrial Hygiene Unit of the State Board of Health. Major responsibilities of the new Committee are the formulation of policy on pre-employment examinations and the revision of the booklet, "Industrial Health," which was published in 1948.

JOHN ROBERT NEWMAN, M.D., "Railroad Doctor Extraordinary," is not only a top medical man, he is also a combination father-confessor and doctor to all. He's been traveling thousands of miles up and down the entire Rock Island system for some 25 years now and the folks he checks are not only "patients" but fellow employees and friends of his. . . . DR. NEWMAN'S job calls for periodic examinations of all employees who are directly engaged in the movement and operation of trains. His "place of business" is a mahogany-panelled office on wheels . . . . the medical examiner's car. It's a converted business car equipped with sleeping quarters. The section now used as a waiting room formerly

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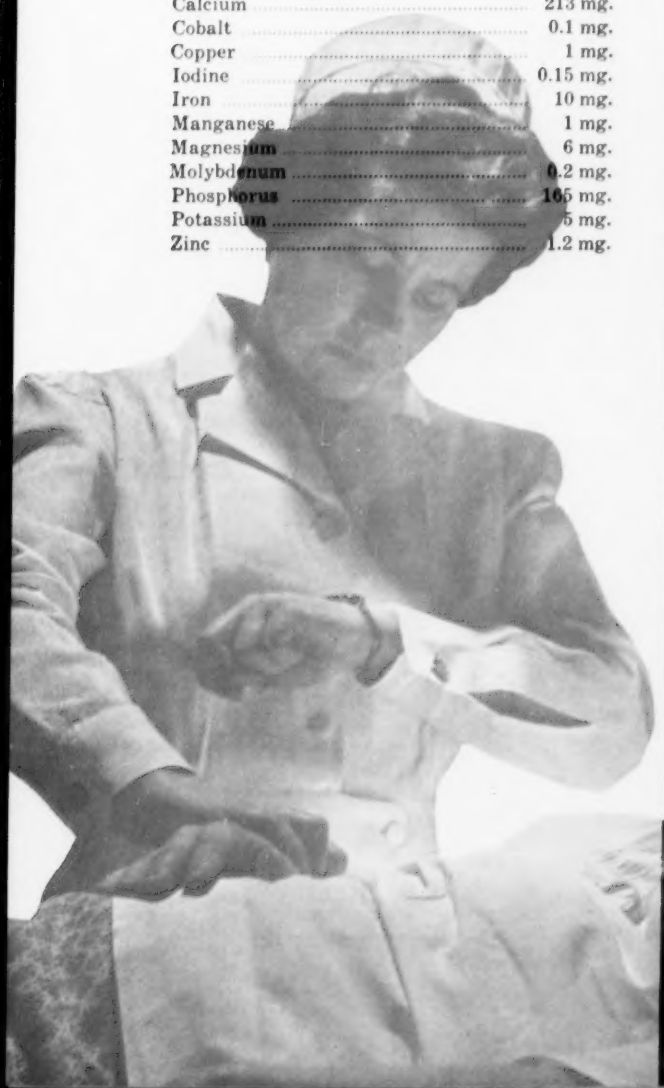

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was the observation area. The "master bedroom" is his office, with its mahogany dresser and closet used for keeping his supplies, and the ex-washroom serving as a laboratory. Employees spot the car in a minute whenever it pulls in and is cut off on a track near the station or on a siding. . . . "DOC" NEWMAN reports directly to CHIEF SURGEON T. L. HANSEN in Chicago. He may be found anywhere on the 8,000 mile system—Kansas City, Shawnee, Oklahoma City, Houston, Fort Worth, Dallas, Fairbury—the whole railroad is his beat. He has come to symbolize the Rock Island in the minds of many people. He was born in Madison, Wisconsin and graduated from the University of Wisconsin. Later he took his degree from Rush Medical College and interned at St. Luke's Hospital in Chicago.

—*Rock Island Lines News Digest*, December, 1954.

ROBERT E. BRUBAKER, M.D., has been appointed Medical Director for Abraham and Straus, one of the leading department stores in New York, beginning January 1. DR. BRUBAKER received his M.D. at the University of Pennsylvania Medical School, 1936. He served with the U.S. Army in New Orleans and the Southwest Pacific, 1942-46. American Board of Surgery, 1946, he practiced surgery in Akron, Ohio, until July, 1954.

JOHN D. NORRIS, M.D., has been appointed Associate Medical Director of the Eastman Kodak Company. He will also continue his present duties as Medical Director of Kodak Park Works in Rochester, New York. He joined the Kodak Park Medical Depart-

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Literature available on request.

1. Brown, S., and Fehlman, B. F.: Missouri Med. *50*:609 (Aug.) 1953.
2. Stephen, C. R., Nowill, W. K., and Martin, R.: Anesthesiology *13*:646 (Nov.) 1952.
3. Flowers, C. E., Jr.: Am. J. Obst. & Gynec. *65*:1027 (May) 1953.

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ment in 1937, becoming Assistant Superintendent of the Department in 1939 and Medical Director in 1949.

ANTHONY J. BARRANCO, M.D., of Lake Wales, Florida, recently has been appointed Assistant Surgeon for the Seaboard Airline Railroad.

ALFRED E. JAMES, M.D., of Albany, Georgia, recently moved to Hurley, New Mexico, where he is affiliated full-time with the Chino Mines Division of Kennecott Copper Corporation as Assistant Chief Surgeon.

WILLIAM G. FREDRICK, SC.D., Director of the Industrial Hygiene Department of the Detroit Health Department, spoke on "Preventing the Occupational Diseases" at the January dinner meeting of the Detroit Chapter of the American Statistical Association.

INTERNATIONAL HARVESTER has established an Annual Award to a St. Luke's Hospital (Chicago) intern in honor of WILL F. LYON, M.D., who retired December 1, 1954, after 13 years as Head of the company's Medical Department. A cash prize of $300 will be given to "the intern at St. Luke's who, in the performance of his appointed duties, best exemplifies the high devotion and dedicated service which have characterized DR. LYON'S professional career."

AERO MEDICAL Association is holding its 26th Annual Meeting at the Hotel Statler, Washington, D.C., March 21-23, 1955. The program provides for 38 scientific presentations, these to conclude with "The Sky Unlimited—A Panel on Extreme Speed and Altitude." JOHN J. WELSH, M.D., American Airlines, Flushing, New York, will discuss "The Medical Problems of Airline Flight Personnel." COLONEL ROBERT J. BENFORD, USAF (MC) is taking over the Editorship of the *Journal of Aviation Medicine*, official publication of the Aero Medical Association. He will succeed DR. LOUIS H. BAUER, First Commandant of the U.S. Air Force School of Aviation Medicine and Founder of the Association.

KANSAS CITY INDUSTRIAL MEDICAL ASSOCIATION is holding its first meeting of the year at the Hotel President, February 10, at 6:30 P.M. PAUL J. WHIT... M.D., Medical Director, ... Chalmers Manufacturing Company, Milwaukee, will speak on "Industrial Noise." Other participants in the Symposium on Noise will be DR. G. O. PROUD, of the University of Kansas Medical Center, and his Associate Otologist, DR. GOETZINGER.

THE WESTERN INDUSTRIAL MEDICAL ASSOCIATION will hold its 14th Annual Meeting Saturday, April 30, 1955, at the Sir Francis Drake Hotel, San Francisco, in conjunction with the meeting of the California Medical Association. At the morning session there will be three scientific presentations on the "Back Problem"—covering the following topics: (1) Type or Classification of Back Conditions; (2) Educational Techniques for Prevention of Back Injuries; and (3) Practical Psychiatric Hints in Handling Back Cases. Also at the morning session will be a consideration of "Psychological and Somatic Aspects of Allergy." In the afternoon a panel discussion will be devoted to "Medical Reports and Medical Testimony as Seen by the California Industrial Accident Commission, Applicant's Attorney, and Insurance Company Attorney." Physicians, nurses, management executives, employment and safety people, lawyers, and others interested in the management, treatment, and consideration of industrial medical and traumatic conditions or industrial compensation are invited to attend. L. E. CURTIS, M.D., 225 Bush Street, San Francisco, is the Program Chairman, and EDWARD J. ZAIK, M.D., 740 South Olive Street, Los Angeles, is the Secretary of the Association.

First Lahey Award

THE first FRANK H. LAHEY MEMORIAL AWARD was presented to DWIGHT D. EISENHOWER, President of the United States, at a White House ceremony, November 16, 1954. This Award was established in 1954 by the National Fund for Medical Education, the American Medical Association, and the Association of American Medical Colleges to recognize distinguished service to medical education. It is a tribute to a distinguished surgeon "who spent his last years in tireless effort on behalf of medical education in America." PRESIDENT EISENHOWER was the recipient of the first LAHEY AWARD "because of his

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great contribution during the formative stages of the National Fund. Then president of Columbia University, he fused the aspirations of doctors, university heads and business leaders to achieve the unique organization that is the National Fund for Medical Education. His devotion to the principle of private aid to medical education and his great concern for safe-guarding the medical schools as a bulwark of the national welfare have set the National Fund on the road to successful achievement of its program." Expressing "my great sense of personal distinction in receiving the Frank H. Lahey Memorial Award" the President said: "The people of our country are justly proud of the unmatched accomplishments of America's medical profession and of its continued progress and vigor in our free society. So long as American medicine remains free, it will remain unexcelled. This very fact accentuates the need for private enterprise in our country to help meet the operating costs of our medical schools. Our people must have adequate medical care; the funds to assure it through medical education must be obtained from our free enterprise system or, if that is lacking, from the Federal government. Federal domination of this basic process in our system would impair its vitality and endanger its preeminence in the world. I therefore warmly congratulate the National Fund for Medical Education, for its efforts are a valuable contribution to the freedom and independence of our medical schools and to the health of our people."

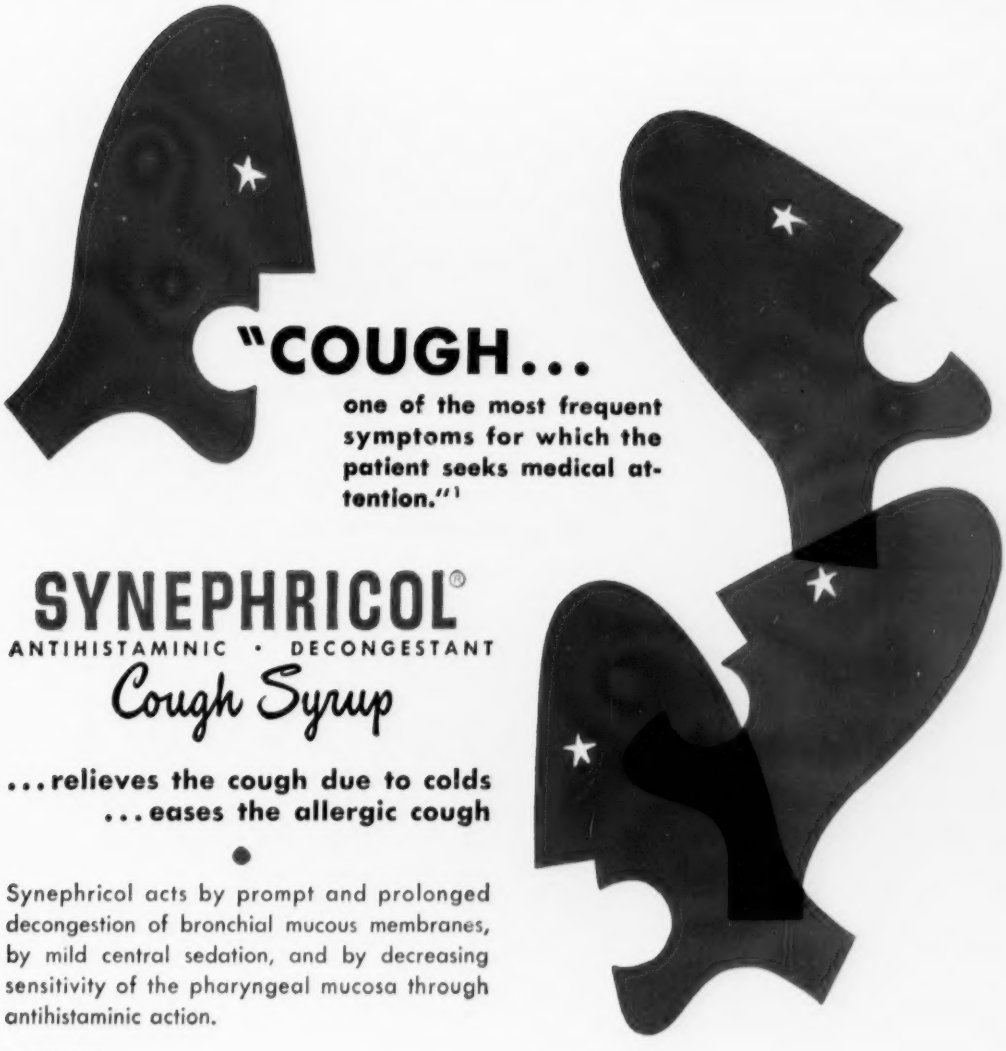
Compensation Problems

LEGAL, medical and administrative problems of the present Illinois Workmen's Compensation Act, as well as probable changes in the Act to be considered by the January session of the General Assembly, will be the subject of five weekly panel-discussions (on successive Tuesdays, February 8, 15 and 22, and March 1 and 8, 1955) at University College, University of Chicago, 19 S. LaSalle Street, Chicago. The series has been arranged in consultation with legal, medical, labor and management associations and is co-sponsored by the Industrial Medical Association, the Central States Society of Industrial Medicine and Surgery, and the Chicago Society of Industrial Medicine and Surgery. "Medical Relations" will be discussed on February 8 by a panel consisting of CARL T. OLSON, M.D., of Liberty Mutual Insurance Company; HERBERT ABRAMS, M.D., Medical Director, Local 25, Janitors Union; and JOSEPH CHIVERS, M.D., Medical Director, Crane Company, under the Chairmanship of JAMES G. MILLER, M.D., Professor and Chairman of the Department of Psychology, University of Chicago. The panel on "The Role of the Attorney" on February 15 will include ARTHUR O. KANE, attorney, and HAROLD KATZ, attorney for the UAW-CIO, Region 4. ROSCOE T. STEFFEN, John P. Wilson Professor of Law, University of Illinois, will preside. On February 22 members of the Industrial Commission of Illinois, as a panel, will discuss "Administrative Problems of the Act." On March 1, EARL STEELE, M.D., member of the Ontario Workmen's Compensation Board, will describe the Ontario System, showing for the first time in this country a documentary film on the operation of the Ontario plan. CARL M. PETERSON, M.D., of the Council on Industrial Health, American Medical Association, will act as Chairman. The concluding panel on March 8, "The Legislative Process," will be concerned with probable or desirable changes in the Act. Panel members are ABRAHAM BRUSSELL, general counsel for the Illinois State Industrial Union Council; DANIEL CARMELL, general counsel for the Illinois State and the Chicago Federation of Labor; and HARLAND L. HACKBERT, attorney for the United States Steel Company. The Chairman will be MAURICE F. X. DONOHUE, Assistant Professor of the Social Sciences and Dean of University College, University of Chicago. All five sessions will meet at University College, 19 South LaSalle Street, Tuesdays, from 7:30-9:30 P.M. Series tickets are $20, now on sale at University College, 19 S. LaSalle Street. Single admissions, $5, will be available at the door, space permitting. The series is coordinated by RUSSELL F. W. SMITH, Assistant Dean of University College.

Deaths

LEWIS RYERS THOMPSON, M.D., 71, Assistant Surgeon General, U.S. Public Health Service, retired, Chevy Chase, Maryland, in the Public Health Service Hospital in Baltimore, November 12, of exsanguination due to bleeding gastric ulcer and pulmonary emphysema. Dr. Thompson was born in Lafayette, Indiana, August 6, 1883, and received his medical degree from Louisville (Ky.) Medical College in 1905. His first professional position was as a member of the Philippine Constabulary from 1906 to 1909. In 1910, he was commissioned Assistant Surgeon in the U.S. Public Health Service and ordered to the Chicago Marine Hospital, where he served until 1913. He was transferred to Cincinnati to serve with Dr. Wade Hampton Frost in studies on the pollution of the Ohio River. He also collaborated with Dr. Frost in an investigation of the large epidemic of poliomyelitis in 1916. In June, 1917, he was detailed principal Assistant to the Director of Health of the Philippine Islands, succeeding to the post of Chief Quarantine Officer two years later. In April, 1921, he became the first Chief of the newly established office of Industrial Hygiene Investigations in the Division of Scientific Research. In 1930, he became Assistant Surgeon General in charge of the Division of Scientific Research, a position he held for many years. From 1943 until his retirement November 1, 1946, he was Associate Chief and Chief of the Bureau of State Services. Among the most notable of his achievements was the organization of the National Institutes of Health, of which he was Director from 1937 to 1942. He was one of the Medical Directors and Chief of the Medical Division of the United States Strategic Bombing Survey in Japan in 1945 and 1946. From 1932 to 1934 he served as Scientific Director of the International Health Division, Rockefeller Foundation. He was a member of the House of Delegates of the American Medical Association from 1932 through 1935, a member of the Division of Medical Sciences of the National Research Council, a member of the American Public Health Association, and a fellow of the American College of Dentists. He was Gilman Thompson lecturer at Cornell University in New York City and De Lamar lecturer at Johns Hopkins University in Baltimore, Maryland.

—*J.A.M.A.*, January 8, 1955.



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1. Banyai, A. L.: Management of Cough in Daily Practice. J. A. M. A., 148:501, Feb. 16, 1952.

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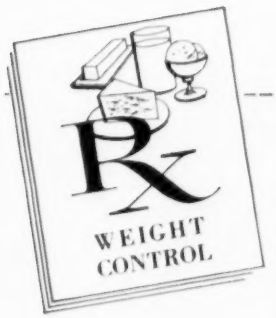

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*Dr. R. J. Murray, Medical Dept., Sperry Gyroscope Co., in an article published in the New York State Journal of Medicine, August 15, 1953 (Vol. 53, No. 16).

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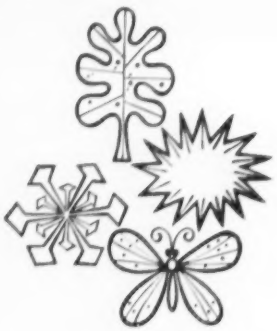

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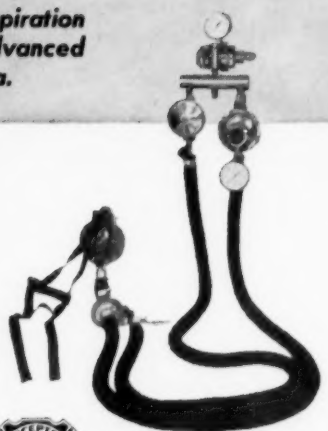

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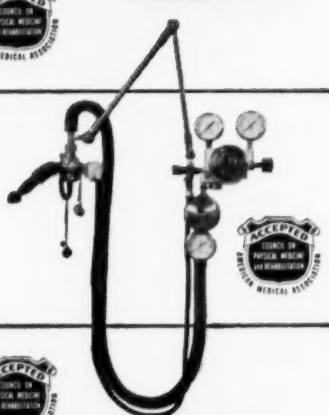

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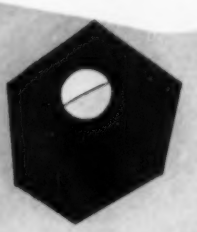

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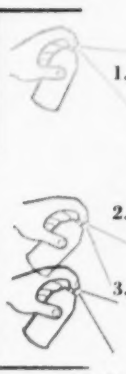

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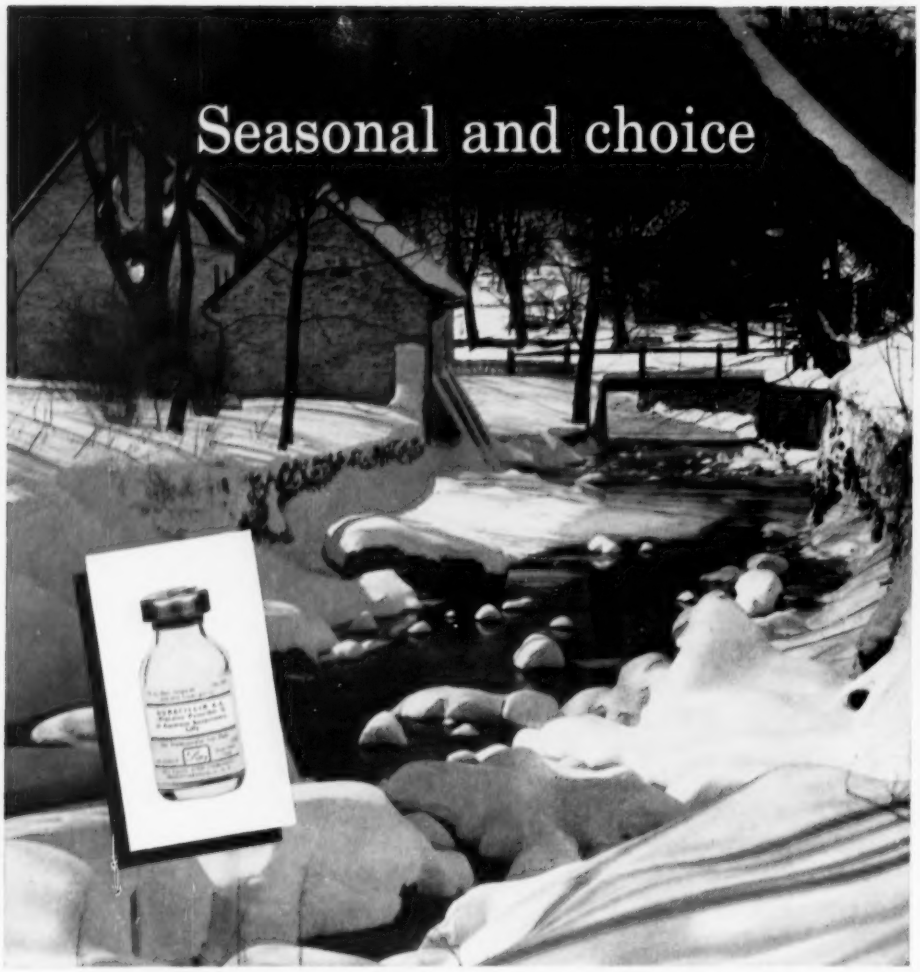

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INDUSTRIAL MEDICINE AND SURGERY

FEBRUARY, 1955

Industrial Asthma and Bronchitis

G. W. H. SCHEPERS, M.D., D.Sc., Director
The Saranac Laboratory, Saranac Lake, New York

THE RECENT revival of interest in the clinical manifestations, epidemiology and pathology of bronchial disease derives mainly from Europe where bronchitis, particularly in England, is a very important cause of ill health and death in the aging population (Stuart-Harris, 1954). The asthmatic state is perhaps currently better recognized in the United States of America. Indeed some scepticism prevails here in respect to bronchitis, and a recent authoritative American treatise on chest diseases disposes of the subject in but one paragraph. Either bronchitis is so commonplace as not to merit full discussion or is so rare as to be suspect as a separate entity. Phillips, *et al*, 1954, refer to it as "a neglected entity" in the United States and emphasize the fact that simple chronic bronchial irritation and inflammation are by far the most common causes of cough. Reference is made also to the disease in numerous lesser papers on specific industrial problems.

The concept of bronchitis or asthma as an occupational disease is not new. In 1931 Collis wrote: "Bronchitis stands out as the chief of dust diseases," and in his later writings this connoisseur of the subject has never wavered in his conviction concerning the industrial importance of bronchitis. Indeed not only has bronchitis proved an important component of the dust diseases, it is now more generally recognized as a factor in many other industrial respiratory system diseases.

In South Africa pulmonary disability other than silicosis or tuberculosis was recently accorded official recognition as a compensable disease in miners (Act 63 of 1952), and bronchitis is one of the major admitted factors in the causation of such disability.

The position of asthma is somewhat different. Coca, Walzer, and Thommen (1931) defined occupational asthma as the "form which occurs in that group of industries in which particular atopens are specifically responsible for the attack," having previously designated bronchial asthma as "an hereditary illness which occurs only in predisposed individuals." The modern conception of these conditions has overflowed the confines of this definition. Industrial asthma is now by no means limited to hereditarily predisposed individuals, though it naturally includes such cases. It may also be more than a mere local manifestation of trauma to the respiratory tract; complex biochemical and endocrinological changes provoked by noxious substances probably gesture in its genesis.

Because of the fact that both asthma and bronchitis occur in the non-industrial personnel as well, their recognition as occupational diseases is fraught with many difficulties. An enhanced incidence in relation to any particular industry naturally serves as a valuable clue. Sydenstricker and Bullen (1927) found the natural incidence of bronchial asthma to be as low as 0.35% in a study of 100,000 skilled workers in various industries in the U.S.A. Hoffman (1926) and Unger (1946) produced figures in close agreement (*ca* 0.5%). In England Coke (1939) recorded the over-all incidence of asthma as 0.6%. The Danish figures may perhaps be more acceptable in view of the complete morbidity statistics recorded there. Norgaard (1938) cites the occurrence as 2% in Denmark. The mortality from asthma is given as 54 and 20 per million in England and the U.S.A., respectively, by Hoffman. The majority of cases of idiopathic asthma, furthermore, commence early in life with an average onset at 23 years (Unger, 1946). Industrial asthma must therefore *à priori* commence later in life. To meet the requirement of statistical prevalence asthma should approximate a 1% incidence in any industry for a causal relationship to be recognized between the disease and the occupation. In the case of millers and cotton strippers this requirement is readily complied with. However, exceptional cases may have to be accommodated even when biostatistical proof is not overwhelmingly convincing.

The natural incidence of bronchitis is considerably higher than that of asthma. According to Stuart-Harris (1954) the disease occurred in about 9.4% of males and 7.5% of females in England during 1950 with a maximal prevalence during the fifth and sixth decades in men, while in women the occurrence of the malady is more or less evenly dispersed over the second to fifth decades. Bronchitis also counts as one of the long disablers among temporary ailments insofar that

40% of attacks last more than 18 days. According to Howell (1951) 97.7% of deaths from bronchitis occur after the age of 40 with emphasis in the 65-74 year age group. In more than 40% of cases the disease lasted longer than 10 years before death.

Disability from industrial bronchitis commences earlier and runs a more rapidly progressive course.

The incidence of bronchitis in the U.S.A. has recently been quoted by Greene and Berkovitz (1954) as ranging from 9% in children and adolescents and 7.4% to 19.3% in non-smoking adults. With such a high natural prevalence rate it becomes the more difficult to differentiate the occupational cases from those not thus caused. Add to this problem the contention of these authors that a form of bronchitis may be found in 76 to 80% of smokers who consume more than 20 cigarettes per day, and it becomes a matter of extremely critical judgment to determine that in any particular case the clinical symptoms are due to a specific occupational hazard. However, it is a well-known experience that bronchitis is rare in cigar and pipe smokers and even that which appears to be related to cigarette smoking is generally quite simply arrested by the cessation of the habit (Greene and Berkovitz, 1954; Phillips, Phillips, Paulls, and Pecora, 1954).

The bronchitis associated with certain industrial exposures may likewise decrease in intensity as withdrawal of the causative agent is achieved. More frequently an irreversible process has been initiated, and the experience of Kilpatrick and Oldham (1954) showed that acute winter exacerbations of chronic bronchitis of industrial origin did not gain any benefit from sulphonamide prophylaxis or treatment. Hodges (1944) and Billen and Albin (1946) had previously shown that sulphadiazine is an excellent prophylactic and therapeutic agent against common respiratory diseases, including bronchitis, afflicting army personnel who had no preceding industrial exposure of material degree or duration. It is a moot point, however, whether in this sort of large scale study the bronchitis has been clearly differentiated from its underlying or associated pulmonary disease.

Where either asthma or bronchitis occurs in overwhelming association with any particular occupation it is a relatively simple matter to infer some causal relation between the work factors and the emergent diseases. The borderline cases are those which give the most trouble and compel one to examine critically the criteria of causality which may be applicable.

While it must be admitted that a great deal of uncertainty still prevails concerning the whole issue, the balance of evidence inclines to the acceptance of bronchitis and asthma as occupational entities under certain circumstances. That such a categorical generalization will meet with violent opposition would not be surprising as we are living in an age of compensation medicine. Almost any unguarded statement may nowadays find its way into the protocols of compensation hearings. It is necessary, therefore, to state with emphasis that, while it is the intention of this review to collate evidence that both asthma and bronchitis may result from exposure to certain occupational respiratory hazards, not every case of either bronchitis or asthma occurring in an industrial worker is necessarily due to the performance of work in such hazardous surroundings.

Each case must in every instance be judged on its own merits and a great many investigations instituted and various critical diagnostic criteria satisfied before a favorable medicolegal determination can be made.

Further epidemiological, pathological, anatomical and experimental research is urgently required, and in this connection the variable susceptibility of individuals to such and other related diseases deserves particularly close scrutiny. As Orenstein (1950) has expresed it: "The equation is not: toxic substance plus organic damage equals perceptible disease, but toxic substance plus organic damage plus John Smith equals perceptible disease."

Nor is it likely that the effect of overlapping influences operative in the modern industrial milieu will be avoided. Even when bronchitis or asthma occurs under circumstances of environmental exposure which meet the criteria rendering these conditions acceptable as occupational syndromes, the influence of additional factors will in most cases have to be conceded. Thus, while the bronchitis or asthma may in the last analysis be admitted to be causally related to the inhalation of some or other mineral dust (quartz or other), organic compound (synthetic or natural), or animate substance (living or dead), it is quite probable that allergy, infection, drugs and medicines, smoking, air pollution, atmospheric circumstances, nutrition habits, general health, and psychosomatic influences may play some additional part in the genesis of each such case. It will be pertinent, therefore, to inquire into the significance of these factors as well. Thus, while bronchitis or asthma may admittedly arise in an industrial worker as a direct result of his employment, such disease may be aggravated by allergy to environmental pollens, the excessive use of or idiosyncratic sensitivity to drugs, malnutrition, superimposed infection, psychological maladjustment, and almost certainly in most instances by smoking. Malnutrition should in this connection be viewed as a dysnutrition, as a large number of bronchitics incline to obesity.

Industrial bronchitis or asthma may also aggravate pre-existing non-industrial pulmonary, cardiac or systemic disease. The industrial bronchitic or asthmatic syndromes may in their turn be aggravated by superimposed pulmonary, cardiac or systemic disease not necessarily related to work factors or even of occupational origin. Such an involved state of affairs defies any attempt at presenting a succinct definition of industrial bronchitis or asthma on an etiological basis. It must also be acknowledged that, if any particular industrial exposure should prove capable of pro-

voking bronchitis or asthma, it may not after all be of any use attempting to differentiate as separate entities bronchitis and asthma of extraneous causation from those states primarily occupational in origin. The former cases will most assuredly be aggravated by coincidental non-industrial factors. If the humane policy of according the benefit of any doubt to the patient were to prevail in all medicolegal decisions the discussion as to whether one should strictly differentiate between non-occupational bronchitis or asthma in industry and truly industrial bronchitis or asthma, would become a matter of merely academic interest. It would not, however, be such a non-pragmatic issue to make this distinction should insufficient proof exist that these diseases may indeed be caused by occupational factors only. This is, therefore, the immediate issue confronting us.

Occupational Asthma and Bronchitis

QUITE a wide variety of separate and unrelated industries have each yielded their quota of indisputably occupational asthmatics, many of whom suffered from bronchitis as well. Unger (1946) has thus enumerated 38 responsible occupations ranging from aquarium suppliers to wig-makers. The employees of these industries have been shown to be exposed to no less than 144 effective incriminating agents including such unsuspected substances as derris root and cuttlefish bone. However, in all these cases contributing aggravating mechanical factors, chemical agents, unhealthy thermal gradients, infections, endocrine imbalances, psychogenic causes, physical exhaustion or poor hygiene have been identified. It may be noted that many of these subsidiary influences are themselves of industrial origin.

Byssinosis is the best and most universally accepted example of bronchitis or of a bronchial asthmatic state resulting either from sensitization of the subject to protein fractions of cotton (Prausnitz, 1936; Goodman, Lane, and Rampling, 1953) or as a response to endotoxins liberated by organisms such as *Aerobacter cloacae, Aerobacter aerogenes* (Vigliani, Parmeggiani, and Sassi, 1954) which may contaminate the cotton. The condition has been well studied and is a compensable disease in several countries.

In the case of bagassosis the mechanism of production may be more or less of the same order as in the case of byssinosis. On the other hand, it is possible that a lipoid component of the bagasse juice may be the cause (Pinto, 1954). In a case collected by Gardner (1943) but never previously reported on, alveoli were filled with macrophages charged with large vacuoles. However, in both bagassosis and byssinosis there remains an undisposed of suspicion of a siliceous factor, Koelsch (1935) having demonstrated that Egyptian and American cotton dust may yield as much as 29% and 50% silicon dioxide respectively, and sugar cane itself has a relatively high quartz content.

Primary allergens may among other factors be the cause of asthma in handlers of cereals (Smith, Greenberg, and Siegel, 1941; Grianti and Bartalini, 1943) and of other types of seeds (Figley and Elrod, 1928; Calapesi, 1953). In the case of cereals, the greatest tendency to allergic sensitization appears to be to wheat—with rye, barley and oats following in that sequence (Baagöe, 1933). Millers and grain handlers are, however, exposed to additional risks which may be a factor in the causation of the disease. The fact that wheat is often handled at inland lake ports with the associated exposure to inclement weather is common knowledge. In addition, the grain may occasionally be contaminated with animate agents capable of provoking acute or chronic disease, to wit, the occurrence of pulmonary infection by *Tyroglyphus farinae* (Marcandier and Le Chuton, 1928), *Aspergillus fumigatus* and *Mucor mucedo* (Vallery-Radot and Giroud, 1928). The "Wheatena" radiological lesion is probably of such animate origin. In addition, there may be some silica or mineral dust mixed with the grain which may account for the mild pneumoconiosis sometimes found among bakers (Krüger and Saupe, 1928).

Closely similar bronchial syndromes have from time to time been recorded in connection with brewers where *Penicillium* spores may have been the factor (Allhusen, 1933); haymakers (Campbell, 1932); and woodworkers (Robertson, 1927, Towey, Sweany, and Huron, 1932). In the latter instance the bronchial asthma was attributable to the fungus *Coniasporium corticole* which grows on maple bark.

The disease in fur handlers may either be a manifestation of true allergy to the fur itself or may be due to sensitization to the dyes used, mainly para-phenylene diamine (Heiman, 1944). Allergies to hides, wool and down are well-known and are simply explained on the basis of protein sensitization. In the wool-handling towns of England asthma is indeed a recognized local problem. Thus Moll (1933) found 47.5% of 40 cases of suspected occupational asthma to be wool sensitive, and desensitization by standard methods seemed to have some effect in minimizing the attacks.

That sensitivity to gum acacia or gum arabic in the printing industry may have an allergic explanation has been fairly well demonstrated (Smith and Burke, 1940; Maytum and Magath, 1932; Spielman and Baldwin, 1933).

It is scarcely the purpose of this paper to enumerate all these factors. Their name is wellnigh legion. Suffice it, therefore, that the allergic or sensitizing factors have hereby been illustrated. More than a decade ago Gardner (1940) expressed the view, moreover, that "most of the organic dusts may cause bronchitis with or without sensitization phenomena resulting in a variety of allergic symptoms." This, too, may yet be true.

On the borderline between sensitivity phenomena and direct chemical action lie the asthmatic complications of exposure to drugs of a diversity of kinds. Brown (1953) has made a recent summary of such drugs, and it may be confidently predicted that the list will grow systematically as new chemical compounds are elaborated and

greater numbers of personnel are employed to create or handle such substances.

Chemical Bronchial Disease

A VARIETY of chemical substances used in industry are capable of provoking acute and chronic respiratory tract inflammation of varying severity. Having regard to the diversity of substances exploited and generated in present-day industry, it is surprising also to find how many substances are apparently inert as far as the bronchial system is concerned though they may have toxic effects in other parts of the body, including the lung parenchyma or upper respiratory tract.

The respiratory syndromes associated with exposure to mineral substances and their inorganic compounds may be manifestations of direct chemical irritation rather than sensitization phenomena. It is remarkable, too, how erratic the different elements are in respect of their effects on animal tissue. Substances close together on the periodic table and very similar to one another may often have comparable toxic properties. On the other hand, they frequently differ widely in their effects. Even more remarkable are the differential influences of various derived salts.

It would not be possible in a review of this nature to list all the chemicals which are thus capable of causing respiratory disease. A few, however, may be mentioned.

Finely-divided platinum and palladium may, for instance, be inhaled without ill effects. The ammonium chloroplatinate salt (Hunter, Milton, and Perry, 1945) and the hexachloroplatinate ion (Massmann and Opitz, 1954) can provoke a classical asthmatic state, fortunately of a transient nature, provided exposure be terminated.

Much more serious are the effects of exposure to certain cadmium fumes. Apart from a growing list of fatalities ascribed to the cadmium (Lane and Campbell, 1952; Reinl, 1953) the inhalation of the vapor arising during welding, soldering, smelting or alloying cadmium-containing substances may provoke, *inter alia*, a bronchitis (Baader, 1951). According to Schwartz and Otto (1924) the sulphate, oxide or carbonate cadmium salts are chiefly to be incriminated, and it is even probable that some of the respiratory symptoms resulting from the inhalation of zinc fumes may be due to contaminating cadmium which may be present in as high as 5% proportions (Carozzi, 1925).

Chromium and fluorides, perhaps more especially the latter, may also be the source of bronchitis arising in welders using electrodes coated with such substances (Charr, 1953; Ahlmark and Lonnberg, 1953). Exposure to chromate fumes alone appears to exert its maximum influence on the upper respiratory tract (Miller, 1953). Chromium has, however, a marked effect in sensitizing various such areas so that bronchial asthma may ultimately ensue indirectly (Smith, 1928; Card, 1935; Hueper, 1942). The recent U.S. Public Health Service survey of the chromate industry has brought to light that the incidence of bronchitis is twice as high in relation to chromate fume exposure as in other industries (Gafafer, 1953). In a parallel study of a ferrosilicon and ferrochrome industry Meyer (1938) found atypical cases of asthma in the latter section of the plant but not in the former.

In the case of fluorine exposure the attendant occupational chest disease is more or less of the nature of a bronchitis. Machle *et al* (1934) reported on the acute bronchitis provoked by hydrogen fluoride fumes, whereas chronic hydrogen fluoride exposure brings about a bronchial hypersecretory reaction, possibly on account of its irritative effects on the gastric mucosa, perhaps directly (Bransburg and Karacharov, 1946). This type of reaction is to be expected in connection with any corrosive substance. Thus bronchitis is a common accompaniment of chronic nitric acid fume inhalation (Taeger, 1939; Treiger, 1947). The same result may follow the inhalation of sulphuric acid mist. Nickel carbonyl, although about five times as lethal as carbon monoxide, may produce only transient respiratory tract irritation when inhaled in low concentrations (Amor, 1935; Bayer, 1939).

Osmium tetroxide has long been known to cause bronchitis (McLaughlin, Milton, and Perry, 1946). Risk of exposure to it is fortunately limited to the osmiridium industry. The inhalation of bromine, iodine or chlorine fumes may provoke marked and typical bronchitis and bronchial asthma (Fairhall, 1948).

Though vanadium is a normal trace constituent of animal tissue, the inhalation of vanadium pentoxide may provoke bronchitis, bronchospasm and emphysema (Symanski, 1939; Wyers, 1946). But this metallic substance need not necessarily be in the form of a fume in order to cause mischief. In a recent experience, for instance, the shovelling of calcium vanadate in a ship's hold precipitated bronchitis and bronchopneumonia (Tara, Cavigneaux, and Del Place, 1953). In a biological sense vanadium is out of character with the elements close to it on the periodic table.

Zinc is well known as one of the causes of brass founders' ague, better known as metal fume fever. It has, however, no local irritant effect on the bronchial mucosa except in the form of zinc chloride (Evans, 1945). Metal fume fever, with or without an associated respiratory component, has been recorded in relation to exposure not only to zinc, but also magnesium oxide fumes as well as to copper oxide, silver, mercury, iron, cobalt, and antimony sprays (Drinker, Thomson, and Finn, 1927).

Among the organic chemicals acetaldehyde is the first to attract attention as capable of causing bronchitis (Flury and Zernik, 1931). Though acetone is rapidly eliminated, it, too, can effect chronic bronchitis on prolonged exposure. Inhalation of the vapor of acridine is extremely irritating but uncertainty concerning the industrial problem exists at present. Acrolein is similarly intensely irritating and as it is a product of the operation of internal combustion engines it may be responsible for certain cases of industrial respi-

ratory tract inflammation. Ethylene oxide which has come into use as a fumigant can provoke acute respiratory tract inflammation and even death. Methyl acetate, used extensively as a solvent of nitrocellulose, is likewise an acutely irritating substance causing among other symptoms an exhausting type of bronchial inflammation. No fatal cases have been recorded (Duquénois and Revel, 1934). Ethyl acetate, on the contrary, is almost innocuous under normal circumstances of usage (Patty and Holden, 1949).

The role of bromine fumes as respiratory irritants has already been referred to and the fumigant methyl bromide retains this property (Clarke, Roworth, and Holling, 1945). The extensive safe use of gasoline may obscure the fact that excessive exposure to and absorption of it may lead to bronchitis, pneumonitis and bronchopneumonia (Machle, 1935). While hydrogen sulphide is better known as an asphyxiant and central respiratory depressant it may also under circumstances of chronic exposure provoke bronchitis of varying severity.

Air Pollution and Irritant Gases

THE effects of the inhalation of phosphorus trichloride, pentachloride and oxychloride are well known in view of their extensive exploitation as war gases. Occasional industrial accidents with these substances still occur. However, if war is to be regarded as an industry—and certainly the making of weapons and substances of warfare devolves on industry—the damage to the respiratory tract, in the form mainly of obliterative bronchitis and sequential epithelial metaplasia, chronic pneumonitis and emphysema, resulting from chemical exposures, must be included in this list. Many of the substances have left their victims cripples of the bronchial asthmatic type. Foremost among these causative agents have been phosgene, chloropicrin, chlorine, diphosgene, dichlorethyl sulphide, thioglycol chloride, methyl dichloro-arsine and beta-beta dichloro-ethyl sulphide.

The effects on the lungs of radioactive substances inhaled on exposure to atomic blasts are still *sub judice* but there is no reason to doubt that the range and diversity of their effects may ultimately prove impressive.

That the prolonged or repeated inhalation of small quantities of chlorine could be capable of producing bronchitis in as high as 17.8% of personnel exposed to it in bleaching factories was established by Kranenburg (1928).

Certain irritant gases in common use are popularly known to be causative of acute and chronic respiratory irritation. A typical example is ammonia which is so irritant that no one is likely to inhale the substance voluntarily for any protracted period. Industrial accidents involving ammonia lead to acute and sometimes residual chronic bronchitis (Mayers, 1947; Fairhall, 1949).

However, it is not merely the irritant properties of the gas that are the cause of the chronic bronchitis. Thus to some individuals there can be no more unpleasant substance to deal with than formaldehyde and yet one can acquire tolerance to it quite rapidly. Technicians in medical schools or phenolic plastics factories seem to survive the pungent effects of formalin for many decades. However, a certain proportion of these become sensitized to the formalin and end up as typical asthmatic cripples (Mayers, 1941), and a polyvalent effect may be created so that the victims later become sensitive to other substances as well (Mayers and Silverberg, 1936; Brackmann and Forker, 1937).

The insidious and often fatal effects of nitrous oxide gas exposure are well known. The NO_2 acts by forming local nitric acid and nitric oxide with the water and oxygen in the air, and these substances react with the alkali salts of the respiratory tract and may thus have a delayed action (McNally, 1942). Even after recovery from the acute phase a chronic residuum of bronchial disease may persist. This may be one of the indirect sources of disability in miners repetitiously "gassed" by blasting fumes.

Employees of sintering plants, such as in the great Canadian nickel industries, which release vast quantities of sulphur dioxide into the atmosphere, seem to become accustomed to working in an environment which is insufferable to the casual visitor. They may even acquire an enhanced resistance to common colds and bronchitis (Johnstone, 1948). On the other hand, sulphur dioxide is currently very much suspect (Pemberton and Goldberg, 1954) as a cause of chronic bronchitis from air pollution. It may be noted that the high incidence of respiratory disease in relation to urban and con-urban polluted air is strongly emphasized where there is smog as well as the sulphur dioxide. In the Canadian nickel refineries the gas is breathed in a hot, dry form by the plant workmen. In the case of the Donora incident (Schrenk *et al*, 1949) and the great London fog (1952) the high moisture charge of the air was capable of dissolving many nocuous gases so that these substances reached the lungs in an altered, more dangerous form. It is possible that the carbon particles of the smog or in the lungs caused these harmful substances to be concentrated where they could cause harm.

The known effects of all these chemical substances give credence to the view that, when dispersed into the atmospheres of cities, they may participate in the enhanced incidence of bronchitis. It is becoming abundantly clear that the relationship between air pollution and ill health is no mere old wives' tale, but may depend in a quantitative sense on the amount of waste product chemicals and qualitatively on the type of such substances which form part of the air pollution. Elements such as calcium, magnesium, nickel, copper, aluminum, zinc, molybdenum, manganese, chromium, iron, antimony, barium, cobalt, lead, silicon, tin, titanium, cadmium, beryllium and vanadium have repeatedly been demonstrated, for instance, in the atmosphere over the City of Detroit (Clayton, 1953).

There has long been a tendency to acknowledge the relationship between smoky and dusty en-

vironments in general and the prevalence of bronchitis and asthma. The statistics concerning morbidity and mortality from bronchitis favor the outdoor workers and are now heavily weighted against the males from the lower social classes employed in dusty trades particularly in areas such as the northern English foggy, smoky industrial areas (Pemberton, 1952; Goodman, Lane, and Rampling, 1953; Pemberton and Goldberg, 1954). Howell's (1951) survey of chronic bronchitis revealed that 40% of his patients had been in contact with dust. The most common diseases affecting firemen are asphyxia, respiratory irritation from smoke, gas poisoning, pneumonia and tuberculosis (Irwin, 1954).

According to Schmidtmann (1930, 1937) exposure of rabbits to Diesel exhaust soot for 385 hours provoked nodular anthracosis, scars, distorted bronchi and epithelial hyperplasia.

In Relation to the Pneumoconioses

ALL THE foregoing are the fringe phenomena and mostly isolated occurrences in industrial medicine. The major occupational chest diseases still remain asbestosis, anthracosis, siderosis and silicosis, and it is in relation to these that bronchitis and asthma acquire their real significance as causes of disability or death.

In earlier years the prevalence of tuberculosis tended to overshadow all accessory phenomena related to these major diseases. The significance of bronchitis was, however, never wholly in abeyance and is reflected best in the earlier works when diagnosis reposed in the hands of skilled clinicians rather than radiologists and laboratory technologists. The description given by Greenhow in 1865 is classical. He emphasizes the insidious nature of the bronchial disease whose identifying feature is "the wheezy asthmatic cough." The observation that "such patients suffer for many months or years from chronic cough or expectoration, without being disabled from work, until the supervention of some acute catarrhal attack, to which persons in this condition are peculiarly liable," is as true now as it was astute then. Greenhow makes reference to a work on Bronchitis published *circa* 1820 in which Sir Charles Hastings recognized the nature of this disabling factor in potters. We might carry this type of reminiscing back as far as Ramazzini who furnished perfectly lucid descriptions of the respiratory disease associated with silicosis, though he naturally had no adequate means of distinguishing between tuberculosis and bronchitis.

Returning once more to the present century one finds that a survey conducted by Becker (1951) on behalf of a Governor General's Commission of Enquiry in the Union of South Africa established the fact that bronchitis was present in every case of silicosis subjected to autopsy. The disease commenced as a clinically silent lesion in most cases and in the later stages of silicosis a progressive infected form of bronchitis often appeared. Bronchitis is thus viewed as part and parcel of the silicotic process. The issue currently disputed in South Africa is whether every case of bronchitis occurring in miners should therefore be designated as silicosis or whether a dual system of compensation for both silicosis and pulmonary disability should be continued. An issue which has not yet been decided is whether the silica is the cause of the bronchitis or whether the disease arises as a result of environmental factors other than mineral dust inhalation.

Becker cites a similarly constant relationship between bronchitis and asthma and asbestosis. Nordmann (1938) had previously emphasized the role of bronchial asthma in asbestosis. But one has to presume that asbestosis varies considerably from industry to industry as confirmation is not universally emphasized. In the Quebec area where the major quota of the world's asbestos is mined there is little respiratory (bronchial) disability attributable to the asbestos exposure itself before asbestosis has reached an advanced state (Smith, 1954; Cartier, 1954). In advanced asbestosis bronchitis may actually be the terminal complication. Both Smith and Cartier stress the point that underground workers may even be healthier than those employed on the surface as they are less exposed to the climatic extremes of Canada.

In his comprehensive memorandum on asbestosis Merewether (1933) makes out no clear-cut case for bronchitis or asthma, though he emphasizes that the terminal event in many cases of asbestosis is a bronchopneumonia. Wood and Gloyne (1934) agreed that septic bronchitis and bronchopneumonia are among the commonest terminal complications of asbestosis. Indeed, bronchitis and bronchiectasia are essential components of the asbestotic phenomenon, and it is in relation to the metaplastic and adenomatous states which ensue that the enhanced bronchial cancer rate may have its true significance. It is therefore somewhat surprising to find that bronchitis is not invariably recorded as an accompaniment of asbestos exposure *ab initio*.

In the case of siderosis pure and simple bronchitis and asthma are conspicuous by their absence. The factors concerned with the production of bronchial disease in welders have already been alluded to. The iron dust or fume is itself innocuous when none of the coating substances include chemically reactive agents, such as chrome or cadmium. Thus even an advanced degree of radiological change may go unsuspected by the welder as it can be entirely symptomless (Doig and McLaughlin, 1938; Enzer and Sander, 1938).

However, electric arc welding may introduce additional factors, and Williman (1935) has reported a fatal pneumonia resulting from exposure to nitrogen peroxide liberated through welding in a confined space.

The anthracosis situation is a mixed one. While there are many who dispute the very existence of a separate coal miners' pneumoconiosis (as distinct from the mischief provoked by the quartz contained in coal dust) the fact that the standard death rate from bronchitis has in the past been

twice to three times as high in coal miners as among other industrial workers cannot be ignored (Collis, 1931). Cummins (1932, 1934), however, queried whether the elderly collier died of bronchitis or merely died with bronchitis and whether the abnormal pullulation of bacteria in the bronchi is the result and not the cause of the lung disability. Sen (1937) has hinted that many cases recorded as bronchitis may indeed be instances of tuberculosis instead.

We also have the view expressed by Haldane (1931) that the high bronchitis mortality in colliers is due to the heavy muscular work they are called on to perform.

Probably the answer to the whole issue is that the effects of coal dust on the human lungs vary with locality, industry or persons. It is often astonishing how long coal miners can persevere at hard work without loss of time for sickness in spite of advanced radiological changes. On the other hand, there is no doubt that other individuals not only develop an advanced and disproportionate respiratory disability but may do so very rapidly, and even before any radiological signs of the anthracosis become apparent. It is indeed these very cases which are most hotly disputed in the law courts or before compensation tribunals, for how is one to diagnose an anthracotic asthmatic disability in the absence of signs of anthracosis? Is the mere fact that the patient worked in a coal mine sufficient evidence to deduce causality? Biopsy may help. Until our diagnostic armamentarium has been sufficiently refined to render diagnosis possible at an even earlier stage than is now feasible, the suspicion will remain that these early cases are nothing but bronchitis or asthma of the same order as that likely to be found in the general population. Where, however, would one ultimately classify these cases if, once the bronchitis or asthma be firmly established, they are allowed to continue their coal dust exposure until a diagnosis of anthracosis becomes permissible? And what of it when the condition becomes aggravated while thus employed at mining or when more serious complications, such as cor pulmonale, follow?

There can be no doubt that under certain circumstances bronchitis and asthma do arise out of the coal mining occupation. Opinion concerning the relationship of such disease to the potential occupational hazards has ranged from the concept that the bronchitis is a necessary precursor of the anthracotic state to its being a complication or a mere concomittant. The importance of bronchitis cannot be minimized. Cummins (1935) suggested that those anthracotic miners who did not die from tuberculosis succumbed ultimately to bronchitis. This same argument may explain the upsurge, too, of bronchitis in South African miners who have been surviving tuberculosis long enough in recent years to fall a victim to bronchitis. Fisher (1935), and Middleton and Heffernan (1936), on the other hand, held that bronchitis among coal miners is a condition leading to dust retention. It is, according to this point of view, causative in relation to the final anthracotic result. The exhaustive recent studies of Heppleston (1954) have also revealed that the so-called perifocal emphysema of coal miners is nothing but a form of bronchiolar and alveolar duct distention resulting from the progressive deposition of coal dust in the walls and surrounding sheaths of the respiratory passages.

The suspicion remains whether some of the associated bronchial disease is not perhaps due to the silica present in the coal dust rather than the carbon particles themselves. In this connection the observation of Hollmann (1928) that two-thirds of a series of graphite and coal miners, who had no radiological signs of pneumoconiosis, and had no silica exposure, nevertheless suffered from bronchitis and emphysema, is of importance. While coal dust may be unable to provoke collagenous nodules in the lung parenchyma, except for its siliceous component, it is apparently capable of inducing at least bronchitis and emphysema by virtue of the copious deposition and retention of the carbonaceous component, and such bronchitis and emphysema are apparently the main causes of disability and death in the anthracotic.

On the other hand, one may demonstrate the presence of coal dust in the peribronchial tissues in some cases without finding a corresponding regional bronchitis.

The role of bronchitis as a cause of death has also been recognized in the cutlery trade. Grinders thus have a "bronchitis" death rate per thousand of 3.68 to 16.15 in the fifth and sixth decades as against a rate of 0.74 and 4.57 in polishers in the same industry (Collis, 1926). The role of gross silica exposure in connection with these trades has since been thoroughly investigated, and considerable improvement in respect of health has been achieved through the substitution of non-siliceous grinding tools.

The cement industry has frequently been cited as an example of one in which heavy silica exposure takes place without the production of either silicosis or tuberculosis. However, the increased bronchitis rate among cement workers may have to be conceded as a direct effect of the inhalation of the dust (Thompson, Brundage, Russel, and Bloomfield, 1928; Russel, 1933). British statistics, however, list cement workers as lowest on the scale of occupational bronchitis, the disease occurring 10 times less frequently than among cotton strippers. Thus the rates recorded by Collis (1931) were respectively cement workers (542), sawyers (792), grain millers (847), coal heavers (1425), cotton spinners (1431), metal moulders (1724), coal boat loaders (1982), brick and tile workers (1994), cotton strippers (5579). These figures speak for themselves.

The observations on the miners of Schneeberg and Joachimsthal who are exposed to nickel, cobalt, uranium, thorium, bismuth and arsenic have suggested strongly that the dust from these ores may cause chronic bronchial disease. Indeed many of the shafts in these mines have for a long time been popularly known as the "death shafts," and

those who died by no means did so solely from lung cancer. It has long been known that in those who do develop cancer, a bronchitis-like state preceded this occurrence by many years.

Reference should be made to experiments conducted by Döhnert (1938) in which mice were exposed for 17 months at the drill holes at Schneeberg and on examination their lungs showed desquamative bronchitis with papillary regeneration, especially of the bronchioli, leading to emphysema and secretory retention.

However, it must not be overlooked that up to 50% of the dust generated in mining these substances consists of quartz and silicates while the arsenical, cobalt, nickel and uranium components comprise less than 10% of the remainder and the balance is made up of ferrous oxide, calcium oxide, and alumina (Thiele, 1928). It is, therefore, strongly possible that the quartz is the cause of the bronchitis. There is, moreover, little industrial confirmation of any specific irritative effects of the other substances on the respiratory tract but experiments conducted by the Saranac Laboratory demonstrated that Cobalt has a specific injurious effect on the epithelium of the respiratory passages. (Schepers and Delahant, 1955).

The most recent of industrial chest diseases, i.e., the pulmonary granulomatosis associated with exposure to dusts such as may be generated in some of the beryllium industries, requires comment here. Vigliani (1948) reported 75 cases of bronchitis among 200 workers engaged in beryllium alloy manufacture, all disability being transient. De Nardi, Van Ordstrand, and Carmody (1949) likewise made reference to tracheobronchitis as an early feature of beryllium exposure. Chronic bronchitis does not, however, feature as a long term correlate of the chronic disease. The extreme dyspnea of the advanced case may give a semblance of a *status asthmaticus* but is not even remotely related to the bronchial asthmatic phenomena, being due to universal involvement of parenchymal tissue in the granulomatous process.

The Sterner-Eisenbud inverted sensitization theory of berylliosis brings this manifestation in line with the general principle of tissue allergy so that an indirect linkage with the fundamental mechanism of asthma is nevertheless postulated.

It is tacitly assumed usually that in any mining operation the most important health risk in respect of chest diseases relates to the presence of respirable dust particles of mineral origin. In the case of mines in which quartz dust constitutes a significant factor the answer is relatively simple insofar as the quartz has such an overwhelming known deleterious effect on tissue. However, the associated stressful factors associated with mining cannot be ignored as causes of respiratory disease. Not only are miners subject to the potentially toxic influences of raw chemical substances to which they may become exposed, but they often cannot avoid inhaling blasting fumes and smokes containing synthetic chemical compounds or drill mists charged with oil particles, all of which may be harmful. Radioactivity has also recently loomed on the horizon, and the demonstrated presence of radon and its daughter isotopes in mines other than the uranium workings (Jacoe, 1953; Harris, 1954) provides a reason for further speculation concerning the nature of industrial bronchitis. In the case of the South African gold mines it has been known for a long time that uranium dust is inhaled along with the quartz, and the presence of deposits of the uranium in the lungs can be demonstrated by means of autoradiography.

It is possible that at least some of the pathological features associated with gold mining may be due to associated exposures to rare or radioactive elements.

Mine dusts also contain other potentially harmful substances. The range of fungi which flourish on mine timber is stupendous, yet virtually nothing is known concerning the effects of the spores or mycelia of such fungi on the human lung. The relatively frequent occurrence of moniliasis and its associated bronchitis in miners deserves further exploration. Miners may furthermore develop an allergy to a variety of organic substances to which they may be exposed in the course of the prosecution of their work. Even the quartz itself may exert its effect through a complicated process of protein denaturing (Scheel *et al*, 1953, 1954), and the altered protein will then act as a foreign substance to which allergy, even of the polyvalent type, may later become established.

The atmospheric inclemencies to which miners more particularly, but also employees in a variety of surface occupations, are exposed constitute further sources of pulmonary ill health. Alternating subjection to extremes of heat and cold and dampness are stresses to which many workmen never grow accustomed. Often they are called on to work graveyard shifts and under circumstances of crises (fires, floods, entombments) such men may heroically meet the challenge, but sustain serious reversal of their health in the process. The influence of increased barometric pressure in deep-level mining (10,000 ft. or more) needs further study.

The chronic lack of normal ultraviolet light dosage may help to undermine resistance to infection, while fear either of disease or of accident, and emotional conflict, the constant companion of even the seemingly most reckless of men, may have a long-term and ultimately effectively disturbing influence on the psychosomatic balance which is necessary to normal respiratory tract health.

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Hematuria and Nocturia in the Industrial Case

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ALL WHO have had experience with patients whose only complaint is that of blood in the urine, well know that it is an alarming symptom that requires immediate investigation to determine the underlying causative factors. Too frequently it is accepted as a clinical entity and medication is prescribed without any knowledge as to the initiating lesion or underlying causes. Since many cases of hematuria are of an intermittent nature, and frequently not associated with pain and discomfort, the patient minimizes the condition, and does not consult the doctor. In these cases where the doctor is consulted, and when at the time of the examination gross hematuria is not present, and microscopic hematuria is negligible (3-4 R.B.C. per low power field) the physician may err by minimizing the episode of hematuria and postpone complete urologic survey.

Hematuria is a term derived from two Greek words meaning blood and urine. Actually it means the presence of macroscopic or microscopic blood in the urine. *It is not a disease* but a symptom of a disease and when the cause of the bleeding cannot be determined is referred to as "essential hematuria."

The presence of hematuria is of singular importance to the industrial physician who should associate this finding with some congestion, inflammation or infection, trauma, or neoplastic disease anywhere in the urinary tract from the tip of a calyx to the external meatal opening. But it may also be associated with or secondary to systemic disease and to diseases of structures adjacent to the urinary tract. In the latter group inflammatory diseases, such as acute appendicitis, acute salpingitis, diverticulitis of the colon, and malignancies of adjacent neighboring structures may be the underlying cause of hematuria. Such possibilities must be carefully weighed in the evaluation of an industrial case presenting the diurnal picture of hematuria.

HEMATURIA may be associated with diseases of the blood or blood-forming organs such as thrombocytopenic purpura, leukemia, hemophilia, polycythema vera and Hodgkin's disease. It is also associated in congestive heart failure or renal infarct secondary to vascular disturbances of the heart.

In industry, exposure to chemicals and, rarely, the ingestion of such chemicals as methenamine, turpentine, cantharides, carbolic acid and sulfonamides may be the underlying cause of hematuria. Hematuria may occur in acute and chronic diseases such as scarlet fever, smallpox, malaria and yellow fever or may be associated with a deficiency of ascorbic acid or vitamin K. It may follow the administration of dicumarol or heparin and, in rare cases, tetanus antitoxin.

The finding of microscopic red blood cells in the urine must always arouse the suspicion of some underlying pathology in the urinary tract. It is an unwise dictum to accept such a finding as normal. Bear in mind that the finding of red blood cells in repeated specimens of urine may denote a pathologic lesion as grave or serious as that observed in gross hematuria. The amount of blood present in the urine is no index of the severity of the lesion. Suffice it to say it is abnormal and demands thorough investigation. In females, urinalysis is of little value unless the specimen is obtained by catheterization.

GROSS HEMATURIA can be roughly classified according to age groups. For example, in the young adult group it can be most commonly associated with some renal infection, usually in the form of pyelonephritis. The infection may be of a specific nature, as tuberculosis, but is most commonly produced by organisms belonging to the colontyphoid or staphylococci groups. A common cause may be renal or ureteral calculus. This entity is more commonly encountered in the older age group, but cannot be categorically ruled out in the younger adult age group.

Gross hematuria as a result of neoplastic disease of the kidneys, ureters or bladder is encountered more frequently after the age of 40, though we have seen cases of papillary carcinoma of the bladder in the third decade group. Interestingly enough, in this group gross hematuria was the only symptom and was not associated with urinary symptoms as dysuria, urgency, frequency and nocturia. In one case the gross hematuria occurred once, subsided, and, though no urinalysis was performed, the patient was told by the doctor that he probably had a "cold" in the bladder. Recurrence of persistent gross hematuria, three months later, alarmed both doctor and patient, and cystoscopic examination revealed papillary carcinoma of the bladder. After the fourth decade gross hematuria appears more frequently as the result of neoplastic diseases of the kidneys, ureters or bladder.

HEMATURIA may be the result of benign or malignant prostatic hypertrophy. A careful study of the symptoms of prostatic hypertrophy reveals that hematuria as a symptom of this condition is too often considered of little or no importance. It has in many cases been entirely overlooked, and, where considered, falsely interpreted. To many the term hematuria brings to mind pathology of an advanced nature, usually that of malignancy. Its occurrence in benign prostatic hypertrophy is not unusual and must always be borne in mind, particularly when evaluating an industrial case of the prostatic age, who, immediately following a mild accident, sudden strain or exertion may present hematuria as an initial symptom. In an attempt to ascertain the relative frequency in which various symptoms of benign prostatic hypertrophy occurred, Young, in a series of a thousand cases, gives 40% as presenting themselves with hematuria. In short, the incidence of gross hematuria is greater in benign prostatic hyperplasia than in prostatic cancer. In this respect it is of interest to note that hematuria and pain, which have been supposed to be so diagnostic of cancer, are shown by Young's figures to be surprisingly common in prostatic hypertrophy of a benign nature. Undoubtedly the consensus is that hematuria may occur at any time. Others fail to associate it with benign prostatic hypertrophy, or, if present, in this condition associate it as due to instrumentation.

That considerable hemorrhage may occur as a result of benign hypertrophy is due to the same causes as in other parts of the body where much congestion exists. This congestion occurs as a result of some physiological alteration. A slight factor of pressure or tension, particularly while engaged in heavy work, added to an already congested organ, will result in bleeding. This is more apt to occur after instrumentation even if only with a soft rubber catheter. We have frequently met with cases of bleeding, assumedly from the prostate, where there has been no previous instrumentation whatsoever. A simple contraction of the bladder wall is often sufficient to cause hemorrhage from the congested vessels of a hypertrophied prostate. This hemorrhage may at times be quite severe.

Some authors point out that this type of hemorrhage is frequently encountered in a group of patients with symptoms of hypertrophy, but who on examination are found to have a fibrous median bar. In these cases there is obstruction at the bladder outlet which produces a venous congestion, not unlike the local condition in hemorrhoids. In dealing with cases of this type, it is most important to reach a diagnosis and to differentiate between benign and malignant hypertrophy. Here digital rectal examination, endoscopic study, roentgenograms, blood studies, including acid-phosphatase, are all helpful in arriving at a diagnosis.

With the presence of hematuria, gross or microscopic in character, emphasis in the history taking must be placed on the genito-urinary system, particularly as to frequency of micturition, both during the day and night, urgency, dysuria, and, with gross hematuria, the onset of the bleeding. In other words a detailed description of the nature of the hematuria may help to determine the site of the lesion. For example, in males it is important to know whether the hematuria is at the beginning, the end, throughout, or independent of micturition.

We speak of initial hematuria when blood appears only at the start of micturition and the urine as it continues to flow becomes clearer. Such hematuria, i.e., initial hematuria is usually the result of lesions of the prostate or in the prostatic urethra. Here blood clots may have accumulated and with micturition the initial urine is bloody and the remainder clear.

In contrast to this the patient may exhibit terminal hematuria, where clear urine is passed until termination of micturition and then the urine becomes bloody. Such hematuria, i.e., terminal hematuria, may result from lesions of the prostate or in the prostatic urethra where the sudden contraction of the accessory muscles of micturition is responsible for the appearance of blood at the end of micturition. This type of hematuria may on rare occasions be seen in vesical neoplasms where the bleeding follows some irritation of the tumor by contraction of the bladder. As mentioned, it may also be encountered in benign prostatic hypertrophy.

In contrast to initial and terminal hematuria one may encounter a case of hematuria in which the urine appears bloody throughout micturition. This is rightfully spoken of as total hematuria. It is usually encountered with lesions of the kidney and ureter. Under such circumstances the blood enters the bladder and becomes well mixed with the urine. This may also occur with lesions in the bladder. If a patient has bleeding independent of micturition, the examiner can assume that the bleeding is produced by lesions located distal to the external sphincter.

In addition to the time factor in relation to micturition, additional information can usually be obtained by scrutiny of the urine as to its color. For example gross hematuria of a darkish brown color usually is the result of a bleeding lesion in the upper part of the urinary tract. In contrast to this bright red urine is usually associated with lesions of the lower urinary tract. As stated, it is best to have a catheterized specimen of urine in the female, since the bleeding, regardless of color, may be coming from the genital tract and not from the urinary tract.

A WORD about nocturia or nocturnal frequency, which is a frequent complaint of the industrial urological case. Properly to evaluate nocturia in a patient it is well to bear in mind that it may occur from other than obstructive or urological conditions. From the urologist's point of view nocturia may be the result of some pathological condition of the urinary tract, such as an infection of the upper urinary tract, infection of the bladder, calculus, or neoplastic disease somewhere in the urinary tract. One must not as-

sume that merely because the patient is referred for a urological opinion the underlying pathology is necessarily confined to the genito-urinary tract. Although probably this is so, it is unwise to assume the classification without investigation.

Frequency of urination, particularly nocturia, in a male adult of prostatic age, could be erroneously accepted as a symptom of prostatic enlargement. But it is also a symptom of arteriosclerotic renal disease. An individual of prostatic age may give a history of frequent voiding at night and even present a slightly enlarged prostate on digital rectal examination. If carefully questioned, he may state that he voids without any difficulty, without force or strain, and has no discomfort as one ordinarily sees in the true "prostate." Further if checked for residual urine it will be found that he completely empties his bladder. In such instances it is more likely that the nocturia is due to renal disease and not to prostatic disease. Obviously, surgery on the prostate in such a case would be of little value in eliminating the nocturia.

One must deliberately and carefully interpret just what nocturia implies. In this respect the urologist would do well to borrow from the internist the impression that nocturia is a nocturnal frequency resulting from an excessive amount of urine produced. One must accept the fact that the nocturia may be purely physiological. It may occur after the ingestion of large amounts of liquids at a late hour. Further, it may be purely psychological as a result of insomnia or restless sleep and the individual finds it convenient to urinate although there is no real urgency.

For this reason every industrial case with a history of nocturia should be questioned as to whether the urge to void at night awakens him or whether it is nervousness that causes the awakening. As Alvarez points out, "once awake a restless person may feel that he or she should go and void, even if the bladder is normal. If relief is temporary and does not last for more than three to 10 minutes, the possibility of interstitial cystitis must be considered, but frequently, if there is no relief at all, and especially if urinalysis is normal, the trouble is probably due to a pure neurosis."

Nocturia may be purely the result of a cardiac or a renal disturbance. Under normal circumstances a healthy person will secrete more urine per hour during the day than he will at night. If the heart is functioning properly there will be no retention of fluid in the tissues but with signs of decompensation there will be a definite nocturia which is an attempt at the elimination of the edema fluid. Where renal failure is present, the diurnal variation in urine formation is modified by a more continuous flow of urine, of a larger volume, and at a more uniform rate, at night, as well as during the day.

Obviously urological cases can be screened by simple urinalysis which will reveal a normal or high specific gravity, with cellular evidence of obstruction, irritation, congestion or infection. Where the specific gravity is low and where polyuria is present during day and night suspicion of a renal (medical) lesion must be considered. In the cardiac case there may be a low or normal specific gravity but the output during the day is relatively low as compared to volume of output during the night. In borderline cases cystoscopy, kidney function studies, and retrograde pyelography will establish the diagnosis. Here again one can readily see the value of urinalysis as a routine procedure in all industrial cases.

The ability to make a correct urological diagnosis is usually in direct proportion to the care and thoroughness in obtaining and recording the industrial case history. The history is only of diagnostic value if the symptoms are recorded in chronological order. Such data are of medicolegal importance as well as of diagnostic value. It is not the purpose of this paper to explain how to make a diagnosis. However if the examiner will take time to record pertinent facts in the history, and has carefully inquired about subjective and objective symptoms, a correct diagnosis from these data alone can often be made in the majority of cases. Confirmation of the diagnosis is then performed by urinalysis, cystoscopy, retrograde urography, intravenous urography where indicated, culture studies, kidney function tests, and examinations of the blood.

Under no circumstances can the presence of blood in the urine be ignored nor diurnal and nocturnal frequency be minimized.

(521 Park Avenue.)

"Absence of Wisdom"

IN OUR present society there seems to be no lack of efficient people, but there is almost complete absence of wisdom. It is not as if wisdom has become extinct. Rather, it has been abandoned as a social value [the highest there is] and therefore many of us live in desperation and fear, looking in vain for the purpose of our existence. The way most of us waste our adult years is indeed a sorry performance composed of illusions, competitions, stereotypes, and narrowed outlooks, in which we exhaust our faculty of acquiring maturity from knowledge, experience, and emotional insight. The result is that at the end of these years which are meant to be the climax of our life span, we are only empty shells, and ready to be nasty, ignorant, and helpless old men and women suffering from all the neurotic symptoms of a past mature infantilism.

—DR. A. J. CARLSON, Professor Emeritus of Physiology, University of Chicago, quoted in *Chicago Tribune*, January 6, 1955.

Parathion Poisoning—A Brief Review

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PARATHION is one of a group of chemically related insecticides that resulted from the search in Germany during World War II for new chemical warfare agents. The various members of this group may be classified as esters of phosphoric acid or certain of its derivatives. Much of the original work on this class of compounds was done by Schrader. The records of his work that were not destroyed fell into the hands of the British and the Russians during the closing days of the War. Portions of the work that had no military security significance were published by British Intelligence in 1947.[1] It is likely that a great deal more information exists in governmental archives that has not been published for security reasons.

The group of compounds may be further identified by a common pharmacological property—the ability to interfere with the function of a group of enzymes that catalyze the hydrolysis of esters of choline. Not all esters of phosphoric acid possess this property and those that do, exhibit activity in this regard that varies over a wide range. The Germans were successful in developing one such substance as a chemical warfare agent[2] although they never used it. In their investigations they also discovered a number of other substances which, while biologically active, exhibited physical and chemical properties, such as low volatility, solubility and stability that rendered them unsuitable for military use. In this category, parathion and TEPP proved to be economically the most important. It might be added that parathion has often been erroneously referred to in the public press as a nerve gas. It is not a gas; in fact, almost negligible volatility is primarily responsible for its having been developed as an agricultural rather than military agent.

The very properties that rendered these substances unsuitable as chemical warfare agents suggested their usefulness as insecticides. In field investigation it soon became evident that parathion possessed a combination of properties that placed it in an unique position as an economic poison. It was demonstrated that it exhibited a range of insecticidal activity that had never before been even approximated by any insecticide of economic importance. Because it poisoned an enzyme system that was present in the tissues of practically all animal matter, there was no insect that was immune to its effects. The combined pharmacological, physical and chemical properties of parathion rendered it more useful for agricultural purposes than any of the other phosphate esters known at that time.

Production which began on a limited scale in 1948 has increased rapidly each year, so that today it is in the position of being one of the most important and widely used insecticides for commercial growers in every section of the United States and in many other parts of the world.

It is unfortunate that the properties which account for parathion's outstanding value as an insecticide render it equally toxic to man and domestic animals. For this reason it has no place in domestic or home garden use.

Since the value and the hazards of the phosphate ester insecticides have become recognized, chemists all over the world have synthesized a truly remarkable number of related substances in an effort to find a substitute for parathion that would combine a comparable degree of insecticidal activity with a low order of mammalian toxicity. The search was conspicuously unsuccessful until quite recently when a compound now known commercially as malathion was discovered. This substance shows promise of displacing parathion as the outstanding broad-spectrum pesticide because of its high degree of insecticidal efficacy and a remarkably low order of mammalian toxicity.

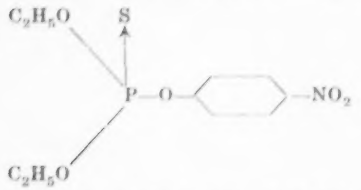
It is interesting to note that in the development of this class of compounds, a number of them, notably DFP, OMPA and TEPP*, have been studied as possible therapeutic agents in diseases of man in which cholinergic activity is considered desirable. Such disorders include myasthenia gravis, glaucoma, and urinary retention. These agents have not been widely accepted for such use because they do not offer sufficiently greater advantages over established drugs to compensate for their low margin of safety. Nevertheless, a number of them have been found to be quite useful tools in pharmacological research.

Parathion has been marketed by a large number of formulators of insecticides under their own labels. In some instances retail formulations have included other pesticides with parathion. Trade names that have been applied to formulations containing parathion include: Thiophos, Niran, Alkron, Lethalaire, Phoskil, Vapophos, Penphos, Genithion and Aphamite. In the German literature parathion is frequently referred to as E-605.

*DFP is diisopropylfluorophosphate; OMPA is octamethylpyrophosphoramide; TEPP is tetraethylpyrophosphate.

Physical and Chemical Properties[3]

PARATHION is the common name for the compound 0,0-diethyl 0-p-nitrophenyl thiophosphate which has the following structural formula:



Technical grade parathion is a clear, medium to dark brown liquid with a characteristic odor that is often described as resembling that of onions. Its water solubility is very low, being of the order of approximately 24 ppm at 25° C. It is completely miscible with many organic solvents. It boils at 157-162° C at 0.6 mm. mercury. Its vapor pressure is as follows:

24.0°C	0.00003 mm.
54.5°C	0.00066 mm.
70.7°C	0.0028 mm.

It is stable at neutral or acidic pH but decomposes readily in an alkaline medium. At pH 5-6 and 25° C, less than 1% is hydrolyzed in 62 days. However, at 25° C and pH 11, the half life is 19.5 hours and at pH 12 it is 1.9 hours while at 49.5° C and pH 11, the half life is 2.9 hours.

The compound is not readily oxidized and is not highly flammable. It begins to flash at 120° C and continues to do so to 160° C. When the small amount of relatively flammable solvent that is present in technical parathion is driven off, no further flashing takes place. It begins to boil at 215° C with decomposition, and when the temperature reaches 221° C the residue supports combustion. Insofar as is known, the products of combustion of parathion are phosphorus pentoxide, sulfur dioxide, carbon dioxide, oxides of nitrogen, and water.

These data are often not readily available to physicians. It is realized that clinicians generally have no great interest in such physical and chemical constants. Nevertheless, it is important that they have easy access to them, for a knowledge of these properties is often of great assistance in determining the likelihood of an exposure to parathion.

Agricultural Considerations

TECHNICAL parathion of a purity of 98.5% is supplied by the manufacturer only to formulators of pesticides. It is then processed and diluted to meet certain specific requirements of the user. It ordinarily appears on the retail market as:

Wettable powder (15% or 25% parathion).
Emulsifiable liquid (25% to 45% parathion).
Dust (1% to 2% parathion).
Aerosol (10% parathion).

The wettable powder, emulsifiable liquid and the dust usually contain only inert ingredients and/or common organic solvents in addition to the actual parathion. The aerosol preparations usually consist only of parathion and propellants commonly employed in aerosol bombs. If the products of individual formulators contain other active substances, it is required by law that such substances be declared upon the label. It is not common practice to combine parathion with other insecticidal agents until such chemicals are put into field equipment immediately prior to application.

In actual use, both the wettable powder and the emulsifiable liquid are diluted with sufficient water to make a final parathion concentration of 0.25% to 0.50%. In some circumstances this range may be exceeded somewhat but this is not a generally accepted or recommended practice.

Following application to fruit or vegetable crops, parathion disappears rapidly. Residue analyses[3] have shown that one week after spraying the greatest residue found was 3.7 parts per million and in most instances it was less than 1 ppm. Two weeks after spraying no residue greater than 0.45 ppm was found.

Physiological Considerations

MOST physiologists today believe that acetylcholine is the chemical mediator of parasympathetic postganglionic and sympathetic preganglionic (synaptic) nerve impulses and probably of nerve impulses from motor nerves to striated muscle. Many neurophysiologists believe that the same mechanism predominates in the central nervous system for synaptic transmission.[4] If this is so, the body requires a means for the elaboration *in situ* of acetylcholine when its presence is required for impulse transmission and for its removal when the need is past. This is thought to be accomplished by the acetylation of choline, $(CH_3)_3$-N(OH)-CH_2-CH_2-OH, through the action of the enzyme choline acetylase and by the hydrolysis of acetylcholine to choline and acetic acid under the influence of the enzyme acetylcholine esterase.

It is, of course, well known that there are a number of esters of choline other than the acetyl that are present in the animal body. Little, if anything, is known of the function of such esters although they are probably not concerned with neuromuscular physiology.[4]

It has been demonstrated that there are at least two types of enzymes that are capable of splitting choline esters (choline esterases). They are chemically and functionally distinct.[4] The first of these, properly referred to as acetylcholine esterase, is found mainly in nerve and muscle tissue and in erythrocytes. It is commonly referred to as cholinesterase, true cholinesterase, or specific cholinesterase and is briefly designated as ChE. It is thought to be specifically concerned with the hydrolysis of acetylcholine (ACh). The other esterase is found in the plasma of certain species, and in the pancreas, salivary glands and other tissues. It is known as choline esterase, pseudocholinesterase or non-specific cholinesterase. True cholinesterase (acetylcholine esterase) hydrolyzes acetylcholine rapidly and strongly and other esters of choline but slowly and weakly. Pseudo-

cholinesterase hydrolyzes esters of choline other than acetyl (as well as certain non-choline esters) rapidly and strongly but acetylcholine only weakly and slowly.[4]

High concentrations of acetylcholine (true) esterase are found in the brain, peripheral nervous system and sympathetic ganglia and lower concentrations in striated muscles and erythrocytes. The quantity of enzyme present in the tissues varies in different species in the following descending order: man, cow, guinea pig, horse, dog, sheep, rabbit, cat. Choline (pseudo) esterase is found in the plasma of most species excepting ruminants, birds and fish.

The plasma of most species contains mixtures of true and pseudocholinesterase in varying proportions although rabbit serum contains mainly true cholinesterase. The plasma of man contains principally pseudocholinesterase, the concentration of which varies from individual to individual over a wide range.

Measurement of esterase activity may be performed by any one of a variety of methods. Most methods in common use today are based upon the principle of measuring, directly or indirectly, the amount of acetic acid liberated by a known quantity of blood or tissue from a system to which excess of acetylcholine has been added. The various methods fall into three general groups, namely titrimetric, manometric and colorimetric. The titrimetric methods may employ either an indicator or a potentiometer to measure the decrease in pH of a system caused by the acetic acid liberated from acetylcholine. The Michel electrometric technique[5] is the prototype of this type of test. The manometric procedure measures the CO_2 liberated from a buffer system containing bicarbonate by the acetic acid formed from the hydrolysis of acetylcholine by the action of the enzyme. There are a number of modifications of this technique originally described by Ammon.[6] The colorimetric method depends upon measurement of residual acetylcholine by determining colorimetrically the amount of hydroxamic acid formed from the interaction of acetylcholine and hydroxylamine. The Hestrin technique[7] is an example of this type of test. A number of difficulties and disadvantages are attendant upon each of these types of procedures and modifications thereof. The colorimetric test is possibly somewhat less accurate than the electrometric and the manometric. Most investigators use either the manometric or the Michel electrometric technique, and for routine use the latter has been found to be the more practical on the basis of simplicity and brevity consistent with a satisfactory degree of accuracy. A modification of the Michel technique permitting the use of finger-tip samples of blood has been developed by Marchand[22] and described by Hamblin and Golz.[8]

The differentiation of acetylcholinesterase from cholinesterase (non-specific) depends upon the comparative rates of hydrolysis of various choline esters. The rate of hydrolysis is directly proportional to the concentration of the enzyme provided the substrate concentration is optimal and constant and in excess. Since the optimal concentration of substrate varies with different enzymes, it is essential that it be predetermined. Furthermore, each enzyme has a range of pH and temperature in which its reactivity is optimum. It is evident then that any determination of enzyme activity must pay strict attention to accuracy of buffer systems, substrate concentration and maintenance of constant temperature. Many confusing results in clinical practice are traceable to carelessness in these matters.

Pharmacology and Toxicology

THE widespread interest in organic phosphorus compounds has stimulated a very large amount of experimental work in many laboratories throughout the United States as well as in England. An up-to-date bibliography of these studies would be quite extensive. Most of this effort has been directed toward the end of discovering the answers to such important questions as the precise site and mechanism of action, degradation products formed *in vivo*, metabolic fate, etc. While many of these questions remain unanswered, it has been determined beyond any reasonable doubt that the only important pharmacological action of parathion discovered to date is its ability to inhibit the enzyme acetylcholinesterase which catalyzes the hydrolysis of acetylcholine. Our knowledge of the physiology of this enzyme is so imperfect that, perhaps, what appears today to be a gap in our knowledge of the pharmacology of parathion may prove to be merely a deficiency in our knowledge of the physiology of the choline ester splitting enzymes.

Since it does not interfere with the enzyme choline acetylase, absorption of parathion is thought to lead to an accumulation of acetylcholine, through a failure of the disposal mechanism, in parasympathetic postganglionic fibers, in sympathetic ganglia and probably in the central nervous system as well as at the myoneural junctions of striated muscle. The resultant clinical picture is one of intense stimulation in these structures, the parasympathetic stimulation being the most readily recognized.

It is not the purpose of this paper to review the extensive experimental work in which the mechanism of action of parathion and related phosphate esters has been studied. Suffice it to say that it is the consensus of investigators working in the field that anticholinesterase activity is the principal, if not the only, mechanism by which these compounds exert their toxic effect. From time to time, the question has been raised as to whether some additional fundamental mechanism may be operative. To date such questions are merely speculative, for no plausible theory nor significant evidence of any other mechanism has yet been advanced. These questions are probably of more academic than practical interest, for (a) there are few if any phenomena that appear after toxic doses that are not explainable on the basis of inhibition of true cholinesterase, (b) toxic signs and symptoms in experimental animals are invariably associated with depressed cholinesterase

activity, and (c) autopsy examination of many species of animals exposed to lethal, toxic or non-symptomatic doses either once or repeatedly over prolonged periods by any route of exposure has never shown any tissue damage attributable to the compound.[9,10,11,13] The reader who wishes to study the mechanism of action in more detail will find numerous articles of interest in the recently published literature.[1,2,9,10,11,12,15]

Parathion enters the animal body readily by any route of exposure. In experimental animals, the single dose oral LD_{50} has been determined to be approximately 4 mg/kg. In rabbits the LD_{50} by single 24-hour skin exposure was found to be 40-50 mg/kg.[14] After repeated daily application, the LD_{50} by skin contact was found to be 5-15 mg/kg.[14] Because of its low vapor pressure, parathion produced no toxic symptoms in rats, mice, guinea pigs or rabbits when these animals were exposed in a vapor chamber to air substantially saturated with parathion vapor for eight hours daily for 36 days.[3] Inhalations of areosol mists and dusts bearing particulate parathion were highly toxic.[3] In two-year feeding tests, rats survived without toxic effects 10 ppm[9] and 50 ppm[3] in the diet (approximately 0.5 and 2.0 mg/kg/day) but larger doses were not well tolerated. When parathion was instilled into the eyes of rabbits, local pupillary constriction resulted.[3,13]

After exposure of animals to lethal or near-lethal doses of parathion, symptoms of poisoning ensue rapidly. By any route of exposure, signs and symptoms appear within the first six hours (and often within the first hour or two) and the clinical picture is usually fully developed within the first 12 hours. Early manifestations are restlessness, tremors and salivation, rapidly progressing to lacrimation, incoordination, dyspnea and diarrhea, and at the height of the intoxication to convulsions, coma and death. In the initial stages of poisoning, both the pulse rate and blood pressure fall only to rise to abnormally high levels as the condition of the animal deteriorates. After the signs and symptoms become manifest, the animals either succumb or make a complete recovery within 24 hours.

Inhibition of cholinesterase activity in both plasma (pseudo ChE) and erythrocytes (true ChE) is the first demonstrable sign of parathion effect. It has been demonstrated repeatedly that 15 minutes after an intraperitoneal injection of parathion, and before the onset of signs and symptoms, significant decreases in both red cell and plasma ChE have already taken place. If animals are sacrificed at this time, one can also demonstrate a diminution of brain ChE. The values for ChE activity in all three tissues decline precipitously and usually reach their lowest level within the first two to three hours. Symptoms and signs of poisoning usually appear when red cell ChE activity declines to a level in the range of 25%-50% of normal. At death these values are usually 10% or less of the pre-exposure or control level and often no measurable activity can be detected in the blood. However, the absence of demonstrable ChE activity in plasma or red cells is not of necessity associated with a fatal termination for experimental animals, and human beings have often been observed to recover with adequate treatment.

If a fatal outcome does not ensue, the ChE levels of the red cells and plasma usually remain at approximately their lowest level for a day or two and then begin a steady increase until normal values are reached. Plasma (pseudo) cholinesterase, which is believed to be elaborated in the liver, returns to normal more rapidly than does erythrocyte (true) cholinesterase, the origin of which is unknown. It has been established that in parathion poisoning, except for the first few hours after exposure, inhibition of true ChE is not reversible and that the time of complete recovery of red cell cholinesterase level is equivalent to the life span of the red cell. This suggests that red cells do not acquire cholinesterase after they have left the bone marrow.

The rate of recovery of enzyme activity varies with different species. In man, with levels at or approaching zero, about three weeks are required for plasma to return to pre-exposure levels, whereas red cell activity returns at a rate of approximately 1% per day. It is interesting to note that in both experimental animals and in man, complete clinical recovery usually takes place within the first 24 to 48 hours and before there has been any appreciable increase in either plasma or red cell activity.

To state this phenomenon differently, during the recovery phase the animal is usually clinically well at blood cholinesterase levels that would invariably be attended by severe symptoms during the induction phase. The reason for this is not definitely known but is probably associated with recovery processes in the central nervous system of the animal which are not measurable during life. It should be kept in mind that in parathion poisoning, we are concerned with cholinesterase activity of the nervous system and that red cell cholinesterase activity is not in any known way concerned with nerve function. It does, however, fairly closely parallel the activity of nervous system cholinesterase and as such it serves as an excellent, although not necessarily precise, indicator of variations in the activity of the enzyme in the brain and autonomic nervous system. In fact, experimental studies have shown that with certain compounds there may be wide differences in degree of cholinesterase inhibition between brain and red blood cell, although with parathion the correlation is good.[13] It should be noted that any correlation that exists between plasma (non-specific) cholinesterase and brain cholinesterase is purely coincidental and results from the fact that phosphate esters are only one of a large group of drugs and chemicals as well as physiological and pathological conditions that affect the plasma enzyme. Indeed, Wilson[15] states that plasma cholinesterase activity may be completely inhibited without any accompanying symptoms.

Because of the relatively slow rate of replenishment of inhibited true cholinesterase, it may be said that parathion is a cumulative poison. Re-

peated exposure to small amounts of parathion (as well as other phosphate esters) produces steadily decreasing levels of enzyme activity and this decrease is asymptomatic until a critical level is reached. The onset of clinical illness is usually abrupt, although not infrequently an individual may complain of vague symptoms for several days while the enzyme activity is hovering around the critical level. It is important to keep in mind the fact that inhibition of the enzyme is not specific for parathion but may result from any similar insecticide so that the effects of exposure to a number of compounds of this class are additive. Similarly, during the recovery phase, slight exposure to either parathion or any functionally similar compound before true cholinesterase activity has returned to normal, may precipitate serious illness.

Clinical Aspects

BY FAR the greatest number of cases of parathion poisoning occur among unsupervised individuals engaged in some phase of insecticide application. As experience in safe handling technique has been acquired and people have learned through unfortunate experience that warnings on labels must be taken seriously, accidental exposures in manufacturing and formulating plants have become quite unusual. Similar experience has been enjoyed by many of the larger and better organized professional spray operators. Manufacturers, formulators and governmental regulatory agencies have made concerted efforts to keep parathion and related compounds out of domestic and household use by restricting sales to outlets that supply professional agriculturists and by establishing regulations governing their use. Despite these efforts, such materials not infrequently find their way to places where children have access to them. As a consequence of such carelessness, cases of poisoning in children are not uncommon.

Poisoning by contact with the sprayed crop is not likely to occur unless the exposure takes place within a day or two of the actual spraying. Residues on crops disappear so rapidly, and there is such large margin of safety in the recommendations and regulations of manufacturers and governmental agencies that there is no hazard to the agricultural worker or to the consumer if the recommended practices are followed.

It has been a matter of experience that in agricultural use, absorption through the intact skin is the most frequent route of exposure. The patient commonly gives a history of having felt perfectly well when he went to work in the morning. He may and frequently does give a history of having sprayed with parathion repeatedly before. Because insecticide spraying is done mostly in spring and summer, the patient has found it too hot to wear the recommended protective clothing and mask and often states that he worked stripped to the waist or wearing only a T-shirt on the upper part of the body. If he has had some previous experience with parathion, he will probably tell the doctor that he sprayed downwind to avoid the spray drift; but, of course, he could not prevent the liquid from trickling back down the hose onto his hand and forearm and onto his trousers. If he is inexperienced, he will often tell of his clothing having become wet with sweat and spray material. As work continues and the morning wears on, he begins to feel weak and tired and notices a dull headache. He decides that the heat is "getting him," and he sits down in the shade to rest and have a cigarette. With the latter, he introduces more parathion into his body via the alimentary tract. He doesn't feel much better after his rest, so he decides to quit for the morning and go to lunch. He may or may not wash up before eating. Lunch is taken without much enthusiasm, for appetite is not very good and the headache, weakness and fatigue are becoming worse. By this time, he has concluded that there is something more wrong with him than heat and sun. He decides to lie down for a while but notices that he feels dizzy and nauseated. Then the balance of the picture develops, often with alarming rapidity. Abdominal cramps set in accompanied by vomiting and diarrhea. There is a feeling of constriction in the throat and chest, and it is becoming an effort to breathe. He notices that he is sweating profusely, and it is becoming difficult to focus his vision. Mental confusion is now evident, and twitching of the voluntary muscles appears. Secretions generally are increased, and excessive salivation is a prominent symptom. The patient is still able to stagger about with difficulty, but he soon collapses. Coma supervenes, accompanied by convulsive seizures, and death is imminent.

There are certain physical signs that accompany this train of symptoms, which are, in the main, manifestations of the intense stimulation of the autonomic nervous system that is consequent to cholinesterase inhibition. When the patient is first seen by the physician, the temperature is usually normal or subnormal, and the pulse is rapid. Early in the course of illness, there is usually some fall in the blood pressure, although by the time medical assistance is sought, it is in most instances elevated, often with a systolic pressure of 200 or more and a diastolic of 100 or even higher. Pallor and diaphoresis are common findings. The gait is unsteady and staggering, and irritability and mental confusion may be noted. In more advanced cases, the patient exhibits drowsiness and muscular fasciculations, or he may be comatose with generalized clonic convulsions. Changes in the deep reflexes are not characteristic and in any given case may be normal, absent or hyperactive. Pathological reflexes do not occur. Physical examination will usually reveal a marked increase in the secretions. In addition to markedly increased perspiration, lacrimation, diarrhea and salivation are often prominent signs. In all cases of moderate severity, auscultation of the chest will reveal signs of bronchoconstriction and increased bronchial secretion. Often these are quite marked and may be troublesome in treating the case. Pulmonary edema is generally reported to accompany severe

poisoning, although several investigators have raised the question of whether true pulmonary edema actually occurs.

Pinpoint, non-reactive pupils are characteristic of poisoning by parathion and related substances and have a great deal of diagnostic significance. However, this miosis may be of delayed onset. Dixon[16] has reported two cases in which the pupils were dilated when the patients were first seen, although characteristic evidences of serious poisoning were already manifest. In both cases pinpoint constriction developed a few hours later. If parathion is introduced directly into the eye, miosis develops early and may be the only evidence of exposure. If the material gets into only one eye, the miosis is likely to be unilateral with inequality of the pupils.

Although most cases of poisoning occur through skin contact, parathion, under ordinary circumstances of exposure, is not a skin irritant, and, therefore, local signs of contact are not present. The individual experiences no discomfort from such exposure and is usually unaware that dangerous quantities are entering his body by this route.

Diagnosis

SINCE the clinical course of severe poisoning is rapid, it is essential that the diagnosis of phosphate ester poisoning be made at the earliest possible moment if treatment is to be effective. It is sufficient to recognize that phosphate ester poisoning exists without identifying the specific agent involved, for there is little difference between the clinical pictures resulting from these several compounds and treatment is the same. As with any other clinical problem, a high index of suspicion on the part of the physician is very helpful. If the clinical picture is predominantly one of parasympathetic stimulation, inquiry should be made to determine whether the patient has had contact with parathion or other phosphate ester insecticides within the *recent* past. If it can be established that the patient had no contact with parathion within the 12 hours preceding the onset of the acute symptoms, the question of parathion poisoning can be dismissed. In cases of occupational exposure, the patient will usually know that he has been exposed to parathion or related substances. If there is any doubt about the identity of the pesticide, the container should be obtained, since the label will show the formulation of the product. However, the mere fact that a patient has had a recent exposure to parathion is not sufficient justification for a diagnosis of parathion poisoning. Many cases have been erroneously reported on no more evidence than this. Such a practice is not only a disservice to the patient but also is responsible for much of the confusion that exists in the minds of many physicians on this subject.

A presumptive diagnosis may be made if, shortly after such an exposure, the patient develops an acute illness in which parasympathomimetic signs and symptoms predominate. The most commonly seen of these are headaches, weakness, blurred vision and dizziness followed by abdominal cramps, vomiting and diarrhea, usually associated with sweating, salivation and muscular twitching. Of the physical signs previously mentioned, constriction of the pupil is the most important corroborative evidence. While a presumptive diagnosis may and should be made on such evidence in order to permit the institution of treatment without delay, it should be confirmed by a determination of cholinesterase activity of both plasma and red cells separately.

Cholinesterase inhibition is the only significant laboratory finding.[12] No important nor characteristic changes take place in the chemistry or morphology of the blood nor in liver or kidney function.[2] Depression of cholinesterase activity of both plasma and erythrocytes precedes the onset of signs and symptoms and is invariably associated with this.[17] Unequivocal inhibition of red cell cholinesterase must be demonstrated to justify a definitive diagnosis, and a diagnosis that is made in the absence of depressed cholinesterase levels is open to grave doubt.

Most laboratories report cholinesterase activity as a percentage of normal. Such a report is readily understood and less confusing than a report which expresses the result in terms of the units of measurement, since the latter differ with the various methods. This practice has the further advantage of permitting comparison of results from different laboratories. However, each report should clearly state the method of determination and, in the case of the electrometric method, the normal values for the particular laboratory.

It is quite important that plasma and red cell activities be determined separately. Red cell cholinesterase is specific for acetylcholine and hence reflects with fair accuracy the state of the nervous system enzyme. Many workers in this field concur in Wilson's[15] opinion that there is a close relationship between intensity of symptoms and the degree of activity of red cell cholinesterase. On the other hand, the plasma enzyme is nonspecific and has no functional relationship to the nervous system enzyme and hence does not necessarily reflect the activity of the nervous system enzyme. In addition, it is inhibited by a wide range of chemical substances, as well as in morbid states (i.e., hepatic insufficiency) which have no effect upon the red cell or neural enzyme. It is quite possible, in the absence of phosphate ester exposure, to encounter a low plasma and normal red cell level. In such a case, if the whole blood has been tested, the combined values for plasma and red cells would in this instance be abnormally low, thereby erroneously pointing to parathion poisoning. It is useful to test for plasma enzyme, however, for it is more sensitive to parathion than the red cell enzyme and, therefore, will fall earlier (and also return to normal earlier). When the test is done periodically, it is a useful and sensitive guide to detection of minor degrees of parathion absorption.

The question frequently arises as to what levels of cholinesterase activity constitute positive evidence of inhibition. If the patient has had previ-

ous tests performed so that his normal or baseline level of activity is known, then any significant deviation from this level in both plasma and red cells may be regarded as a positive test. If the case is one of acute poisoning, there will usually be no doubt, for symptoms rarely appear until both plasma and red cell levels fall below 50%. Difficulties in interpretation arise when an individual has had one or more minimal exposures and his own normal level is not known. There is a great deal of variation between individuals in normal levels of activity in both plasma and red cells, and this variation is particularly great in plasma. Using the norms originally published by Michel[5] of △ pH 0.703* for plasma and 0.753 for red cells, normal ranges for unexposed individuals are 60%-250% in plasma and 80%-120% in red cells. However, it is noteworthy that the normal levels for any given individual remain quite constant from day to day and month to month. The great advantage of a pre-exposure measurement is, therefore, obvious. When the pre-exposure level is unknown, a presumptive diagnosis may be made if both plasma and red cell levels are below an arbitrary level of 75% or if serial measurements taken at intervals of a few days during continuing possible exposure reveal declining activities.

In an attempt to find a simpler procedure for the laboratory diagnosis of parathion poisoning, several workers[18,19,20] have investigated the excretion in the urine of p-nitrophenol following exposure to parathion. The validity of the test is based upon the observation that p-nitrophenol is one of the end products of parathion metabolism in vivo. This substance is not normally present in the urine. Results with this method have been disappointing. It appears to be specific for parathion and related substances containing the nitrophenyl group but is of no value in cases involving insecticides that are functionally similar but that do not contain this group (e.g., TEPP). The test may have some medicolegal value where it may be important to identify the poison as precisely as possible. The correlation between the amount of p-nitrophenol present in the urine at any given time and the clinical condition is not good. The appearance of the substance in the urine is often delayed as long as 24 hours after exposure, and its excretion continues erratically for weeks.

Prevention

PARATHION poisoning can be prevented. This has been repeatedly demonstrated by commercial spray operators who use large quantities of parathion month after month with no illness among their employees. As an example, the authors know of one commercial grower who uses 40-50 tons of formulation equivalent to 10 tons of technical parathion per season and whose employees handle the insecticide month after month without even minimal decreases in cholinesterase levels. Parathion can be and is handled safely but only if the recommendations for safe handling that are published by manufacturers, formulators and governmental agencies are followed strictly. Hayes[21] has stated that "accidents with pesticides which do not involve a violation of the instructions and precautions on the label are extremely rare." Those physicians who are interested in the detailed instructions for safe handling may obtain them readily from either the distributors or the manufacturers of the material.

An important part of the prevention of accidents is the routine, periodic determination of cholinesterase levels in plasma and red cells. If workers who are handling parathion or functionally related pesticides show declining levels of activity, they should be removed from further contact before clinical illness appears and should remain free of further contact until these levels have returned to normal.

Treatment

A CASE of acute fulminating parathion poisoning presents an extreme therapeutic emergency. It has been pointed out by one of the writers (D.O.H.) and Marchand in a previous paper[17] that no time can be squandered in the search for special drugs or transportation to a hospital without grave risk to the patient. Delay in the prompt institution of treatment can easily prove fatal.

Atropine, preferably administered intravenously and in quantities much greater than are normally employed, is the essential element of treatment. It has been pointed out by Grob and Harvey[2] that one of the characteristics of phosphate ester poisoning is an increased tolerance to atropine. There appears to be in the minds of many physicians an exaggerated fear of the toxicity of atropine. Grob states, "Overatropinization may be incapacitating but presents little danger to life. A single dose of as much as 10 mg. of atropine has been inadvertently administered intravenously to normal individuals without endangering life. . . ."

We believe that little useful purpose is served by "breaking down" the effects of phosphate ester poisoning into muscarine- and nicotine-like effects plus central nervous system effects, since the only over-all effect which can be clearly demonstrated is that of acetylcholine accumulation as a result of the inhibition of acetylcholinesterase. The effects of atropinization have been studied largely in animals other than man and vary widely from species to species.[23] It would appear that statements to the effect that atropine is without effect on the neuromuscular end-plate in man in such heavy doses as might be used in phosphate ester poisoning have not been clearly substantiated. At any rate, it is clearly demonstrable that atropine, when pushed to therapeutic limits has time and time again proved a life-saving measure in the most severe cases of poisoning of this type. Grob and Harvey[2] have said that, "Se-

*It is recognized that this value is probably lower than would be the mean of a large group of normal individuals. Nevertheless, it has become established as a standard value of this technique and has been widely used. In the interest of uniformity and clarity, it is recommended that it continue to be used.

vere symptoms should be treated by the intravenous administration of 2 to 4 mg. of atropine. The effects of intravenous atropine begin one to four minutes after injection and are maximal within eight minutes after injection." If symptomatic improvement does not occur and "if signs of atropinization do not appear, the intravenous injection of atropine in doses of 2 mg. should be repeated in five- to 10-minute intervals"[2] until one or the other occurs. They further suggest, and we agree, that, "A mild degree of atropinization should then be maintained for at least 48 hours."

Obviously, if signs of pulmonary edema or excessive moisture of the lungs appear, postural drainage can be employed. Likewise, if respiratory depression appears, artificial respiration supplemented by an oxygen mask should be employed without hesitation. It is generally accepted that the Eve Rocking and the Holger-Nielsen methods of artificial respiration are those of choice.

It has been suggested by Grob[2] and others that if convulsions are prolonged and not relieved by atropine, barbiturates or trimethadione may be judiciously employed for the control of convulsive seizures. Morphine, because of its respiratory-depressant effect, is clearly contra-indicated.

As soon as it is possible to do so without prejudice to any emergent measure of treatment, the patient should be thoroughly bathed with warm and copious amounts of soap. At the same time the fingernails and toenails should be cleaned and scrubbed with generous quantities of soap and water. These measures should not be neglected, for inapparent residues of parathion may be present on the skin or under the nails which, if not removed, will represent a source of further absorption and constitute a hazard to recovery.

The patient must be watched carefully for 24 hours or possibly longer and, should the need arise, bronchial drainage must be repeated, and atropinization, as well as artificial respiration and oxygen, continued as long as doubt as to the outcome remains. Phosphate ester poisoning is essentially an acute episode and the patient is either dead or well on the road to recovery by the time 24 hours have elapsed.

We have made every effort to watch this picture and, on the basis of all of the reports at hand to date, we know of no instance in which there has been demonstrated conclusively any residual effects of such poisoning.

Patients recovering from such poisoning should not be permitted further exposure to any of the phosphate esters until plasma and red cell cholinesterase levels have returned to normal values.

In well-organized operations, whether they be of spray applicators or formulators, blood and plasma cholinesterase levels by an accurate method, such as that of Michel or the manometric technique, will have been systematically and routinely employed so that this last overwhelming exposure will have been prevented. We cannot emphasize too strongly the value of such routine determinations where phosphate ester exposure is prolonged or oft-repeated.

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A Medical Function

OTHER professional groups such as psychologists, teachers, ministers, lawyers, social workers, and vocational counselors, of course, use psychological understanding in carrying out their professional functions. Members of these professional groups are not thereby practicing medicine. The application of psychological methods to the treatment of illness is a medical function. Any physician may utilize the skills of others in his professional work, but he remains responsible, legally and morally, for the diagnosis and for the treatment of his patient. The medical profession fully endorses the appropriate utilization of the skills of psychologists, social workers, and other professional personnel in contributing roles in settings directly supervised by physicians. It further recognizes that these professions are entirely independent and autonomous when medical questions are not involved; but when members of these professions contribute to the diagnosis and treatment of illness, their professional contributions must be coordinated under medical responsibility.

—From "Resolution on Relations of Medicine and Psychology," in *J.A.M.A.*, September 4, 1954.

Can Pre-Employment Serologic Tests for Syphilis be Justified?

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THE question postulates the use of the pre-employment examination. The purpose of this examination is to determine whether the person in question is physically and mentally fit for the position for which he or she is being considered. Beside the physical condition, there are other important qualifications, such as character and reliability, training and ability. I am informed that a generation ago certain employers rejected for jobs men who were cigarette smokers.

Contrary to the attitude of some compensation board referees that all employees are healthy until they claim an injury, most adults have some minor physical defects or diseases which will eventually cause trouble and require medical attention. This was probably best demonstrated by the results of pre-induction and induction examinations in the last world war. Even with such rather thorough examinations and elimination of the majority of those considered physically and mentally unfit for such service, a large number were accepted into the services, only to demonstrate later their previously undiscovered defects. While the percentage was not large, the total number in the 18 million ex-service men and women will continue to place a burden on the American taxpayer.

However, industrial management has not yet been generally sold on the advisability or necessity of applying pre-employment examinations as a qualification for employment. Many large and progressive companies have adopted this requirement, especially for work that requires rather arduous physical effort. While such large industries give pre-employment examinations, the major percentage of newly employed persons are taken up in small companies where such practice is comparatively uncommon. It is true that more and more are adopting the practice, and in some cases the examination itself is being made more extensive than previously. For example, x-ray examination of the chest is being used, especially in companies where there is a possible dust hazard. Blood counts and chemistry are used in some industries where there is a questionable hazard in the manufacture or handling of toxic materials.

If the pre-employment examination is justified —and I believe there is ample evidence that it is indicated in heavy industries and in those where unusual occupational hazards exist, or where health and insurance protection, preventive care, and personnel practices are an important part of an employee benefit program—then how extensive should such an examination be? The results of rather complete life insurance examinations indicate that the effects are largely apparent for only about the first three years. Many health insurance contracts are issued on the basis of answers to about 12 leading questions, as experience has demonstrated that the cost of doing pre-insurance examinations is not reflected in savings against unforeseen claims.

The question then is, does a previous syphilitic infection disqualify an applicant for work? When an early infection in an active stage is found on examination, there is general agreement that the individual should stop work until he or she has had proper treatment. With the present use of antibiotics such treatment should not require more than several weeks' loss of work, as contrasted with one to several months when arsphenamines were the principal therapeutic agents. The "company doctor" or the attending physician will report such a case to the local health authority, but cannot do the further investigation that is indicated.

In the later silent or asymptomatic stage of the disease, diagnosed only by serologic tests, the individual is usually employable. If the disease is permitted to progress without treatment or with incomplete treatment, a fair percentage will eventually develop evidence in such forms as chronic cardiovascular or cerebrospinal disease. Even then, about 50% will be amenable to modern therapy and will be re-employable, provided the disease is discovered before severe damage has occurred.

With the usual practice of depending largely on younger age groups as the source of new employees, such defects will not make their appearance, lacking proper treatment, until the employee has developed many years of seniority.

It would appear from an epidemiological standpoint that the dangers from the syphilitic in certain occupations, such as food handling, have been overemphasized. It is of course conceivable

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that the disease might be transmitted by indirect contact, but late syphilis is rarely transmitted except by intimate or promiscuous contact; and, except possibly for esthetic reasons, a latent syphilitic is employable and without danger in ordinary occupational or social contacts. There have been a number of other seemingly exaggerated statements as to the dangers of employing a syphilitic. Joseph Earl Moore, Head of the Syphilis Clinic of Johns Hopkins, has offered about as concise a rebuttal to these claims as I have seen. He has stated, "So far as is known, there is except in rare instances, no good evidence to indicate that a syphilitic worker is any more likely (a) to be involved in accidents than his non-syphilitic brother; or (b) if involved in an accident, to suffer any more serious or prolonged disability; or (c) to suffer more severely from intercurrent non-syphilitic diseases; or even (d) to undergo material shortening of his life span. Whatever risk there may be against any of these eventualities may be largely guarded against except in cardiovascular or neurosyphilis by adequate treatment." It is too early to know whether the complications of specific cardiovascular and cerebrospinal disease can be entirely prevented by the use of the newer combinations of treatment, but the present results indicate that they largely can be controlled.

In certain industries, such as the railroads and commercial air lines, pre-employment blood tests have been advocated for trainmen and pilots partly on the basis of possibly preventing serious accidents from man failure due to active cerebrospinal disease. Such a possibility seems remote, as these employees are examined at least annually, and any indication of such a development should be picked up in the 10 to 20 years elapsing between the time of primary infection and the late complication.

Although I have been unable to find recent accurate figures as to the incidence of positive blood findings in the pre-employment examinations of such groups, I am informed that a positive blood finding is unusual. In one large heavy industry, where pre-employment blood testing has been routine for a number of years, my correspondent writes, "Our percentage of positives is *so* low, we wonder whether it is worth the trouble. We go months and months without a positive." It is possible that the practice of making routine blood tests on applicants, if known, may keep the syphilitic person from making application for a job.

One might look for other reasons then, for adopting routine pre-employment blood testing. We can look at the admissions from the ranks of the employed to state hospitals due to late luetic complications. The rate has been steadily falling over the past 10 years and the percentage of so-called "cures" is increasing. One can find some evidence of the fatal effect of uncontrolled forms of the disease in life insurance statistics and from the National Office of Vital Statistics' figures. However, most of these figures will represent residuals from "pre-penicillin" days.

The average large company still sees an occasional employee who has developed evidence of an unsuccessfully treated infection. However, the incidence of new cases has shown a predicted decline, partly as a result of concerted efforts of public health agencies together with the rapid sterilizing effect of antibiotic treatment. From the government reports, of a total of all types of syphilis cases of 267.9 per 100,000 of the country's population in 1944, the estimated figure for the year 1953 is 100.8, or about one-third of those reported 10 years ago. The more remarkable is the drop in reports of primary and secondary cases from 61.7 per 100,000 in 1944, to 6.2 in 1953. That is a marked decline for which hard working case investigators may be proud. It is possibly true that these quoted figures may not be a sound index of the total number of new infections occurring, but they are sufficiently accurate to reflect the comparative status of the disease prevalence.

Using the 1953 figures as a basis for evaluation, i.e., one new case of new or old infection reported per 1000 of population, I think one may agree that the percentage does not suggest a valid reason for doing routine pre-employment serologic tests. It must be recognized, however, that there are sufficient exceptions to the above figures, particularly in certain socioeconomic and geographically located groups to indicate that such routine testing may be indicated as a screening procedure in lieu of history taking and physical examination, or where the suspected or known incidence of disease is higher than average, and the facilities for running the tests are readily and not too expensively available.

In Terms of Humanity

ACCORDING to social scientists like Elton Mayo, the modern industrial community shows three characteristic abuses—the abuse of science, the abuse of riches, and the abuse of power. Industrial medicine seeks to mitigate the rigors of such abuses by using science in terms of humanity. This comes natural to medicine, for it is at once a social science and a natural science. The physiologic principles of the human body are regulated by laws of physics and chemistry, but those of its sentiments and mind flow from laws of psychology, morality, and esthetics. The trouble is that these latter laws are not yet as well understood as those of physics and chemistry. A bigger trouble is that few leaders and executives of industry are interested in them.

—DR. H. P. DASTUR, Medical Officer in Charge Industrial Health Department, Tata Industries, in *Proceedings of the Society for the Study of Industrial Medicine*, September, 1954.

Health Examinations in Industry

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ANNUAL physical examinations are routine in many companies, are advised and performed by many physicians, and are recommended by authorities, insurance companies, and various medical organizations. There appears to be, however, some controversy as to the merits of this procedure, and it has been suggested that a careful history of the patient, covering each organ system would be more fruitful as concerns time, cost, and accomplishments.[1] This same source[1] mentioned the results analyzed by Baker and his co-workers based on 2,178 examinations.

The Medical Division of E. I. du Pont de Nemours and Company has coded the physical examinations done from 1939 until the present time. The findings have been transferred to IBM punch cards, and filed for future study. They were coded according to a modification of the 1929 revision of the "International List of the Causes of Death." These examinations are done routinely at the time of pre-employment, and at approximate yearly intervals thereafter. In addition to a complete physical examination, employees have a complete blood count, hemoglobin, urinalysis, Kahn, chest x-ray, eye test, and, in many instances, an audiogram. An electrocardiogram is done routinely after the age of 40 years, or before age 40, as indicated, based on cardiac examination or the cardiac history. Also, on male employees 40 years and older, rectal examination is performed. We have thus coded a total of 500,000 records over a 15-year period. These records were recently studied from several aspects, and have been the nucleus of four published (or to be published) medical papers.[2,3,4,5]

As a consequence of this study, and based on our experience, we believe that the physical examination serves a definite need, in industry at least, and quite possibly for the population at large. It became equally clear, moreover, that a careful history, particularly as concerns genetics (family history), past history, symptoms, and signs, was a most potent adjunct in a study of the findings on health examinations. It is our intent to supplement the health examinations with a more adequate pre-employment history than heretofore used, and to maintain this history in a dynamic manner, also putting it on punch cards, so as more accurately to correlate and study its relationship, value, and importance in a preventive medical program, and to ascertain its value in the possible predictability of diseases. The facts bearing on these points are discussed in the above-mentioned publications.[2,3,4,5]

The purpose of the present study is to summarize the findings on 27,718 male health examinations, the males varying in age from 18 to 65 years, for a one-year period, June 26, 1953, to June 25, 1954, covering 26 locations, in 17 states. There is admittedly, some overlapping in the various findings. We deemed it more accurate, nevertheless, to report the findings as they were noted on the physical examination cards. We are unable to record the exact percentage of the findings which were known to the employees prior to at least the initial Du Pont Company examination. From personal experience in an area where approximately 10,000 of these examinations were performed, it is our impression that about one-fourth of the combined findings were unknown to the individuals prior to our examination.

The results of this one-year survey of findings on the examinations, and laboratory data diagnoses, are set forth in Tables I, II, III, IV, V, and VI.

TABLE I.
SUMMARY OF THE FINDINGS ON PHYSICAL EXAMINATIONS
ON 27,718 MALES DURING THE PERIOD JUNE 26, 1953, TO JUNE 25, 1954

APPEARANCE	
No abnormalities	23,194
Not noted	2
Skin disease present	1,623
Scars, unspecified	895
Lipoma, ganglion, fibroma	420
Postoperative scars (removal of cysts, cartilage of knee removed, shoulder dislocation repair, etc.)	400
Burn scars	255
Warts, moles	170
Acne scarring	167
War wound scars	130
Varicose vein ligation	88
Birthmarks	79
Pallor present	66
Pigmented areas	45
Osteomyelitis scars	36
Tremor of head	22
Facial paralysis	20
Telangiectasis, spider angiomata	18
Skin cancer removed	15
Cyanosis present	12
Hairlip repair	8
Depression, skull fracture	7
Varicose ulcer-healed	6

TABLE I—CONTINUED

SUMMARY OF THE FINDINGS ON PHYSICAL EXAMINATIONS ON 27,718 MALES DURING THE PERIOD JUNE 26, 1953, TO JUNE 25, 1954

Skin cancer present; leukoplakia; generalized tremors *each*	5
Gunshot wound scars, not specified as war injuries; hemiplegia *each*	3
Spur of foot (visible); total alopecia; skull plate, shell scar; excessive dryness of skin; old tuberculous scar, right thigh; female fat distribution; female hair distribution; hirsutism *each*	2
Jaundice present; cerebral palsy; left shoulder girdle, left arm and chest atrophic below mid-third, representing so-called "ostrich legs" as seen in Charcot-Marie-Tooth disease; condylomata accuminata; embedded cinders, right shoulder and knee; buckshot in chest wall and neck; exotosis; mottled appearance to skin; stones removed, submaxillary duct; lymphosarcoma biopsy; right temporal scar for trigeminal section; facial asymmetry and undershot jaw; cerebral hernia, right parietal bone; tortuous temporal arteries; tips of fingers suggestive of clubbing; mask-like facies, some rigidity; arms and legs somewhat short, achondroplastic; asymmetrical mandible; absence of hair on entire trunk; unable to open mouth more than one third *each*	1

RIGHT EYE

No abnormalities	27,273
Not examined	3
Arcus senilis	280
Disease of external eye or eyelids	118
Pterygium	99
Cataract	88
Strabismus	83
Examination unsatisfactory, or not visualized	62
Pupils irregular	57
—unequal	94
—do not react to light	24
—do not react to accommodation	23
No vision	50
Arteriovenous nicking	32
Exophthalmus	30
Corneal scar	24
Cornea—cloudy	23
—ulcerated	2
Nystagmus	19
Pterygium removed	10
Increased physiological cupping	9
Healed, scattered, retinal lesions; blurring of disc margins *each*	8
Cataract removed *each*	6
Increased pigmentation of retina; myelinization of optic nerves *each*	5
Iridectomy; mottled area, macular degeneration *each*	4
Opacity or scarring of lens; spasm of retinal vessels; increased tortuosity of vessels; detached retina *each*	3
Lens hazy or cloudy; synechia; scarred iris; widened palpebral fissures; diabetic retinitis; increased light reflex: *each*	2
Pupils small; recent strabismus operation with edema; operation for strabismus; detached iris; paralysis lateral recti muscles; scarred iris and pupil; scarred and distorted pupil; pigmented reddish area of iris; hemorrhage of eye; sub-conjunctival hemorrhage; conjunctiva injected, flash burn; conjunctiva pale; conjunctiva scarred; pigmented scar of sclera; deep pigmentation of iris; old injury of cornea; cloudiness and corneal lesions, keratitis; tumor removed; foreign body, cornea; symblepharon; postoperative scar conjunctival flap; pigmented patch, bulbar conjunctiva; edema of disc; pallor of optic disc; depigmentation of retina (loss of central vision); healed chorioretinitis; choked disc; optic atrophy; narrowing of arteries and opacity; pale, optic disc, and spasm of arteries *each*	1
Retina—hemorrhage	1
—exudate	3
—sclerosis	168
Conjunctiva—ulcerated	0
—congested	120
—jaundiced	2

LEFT EYE

No abnormalities	27,258
Not examined	5
Arcus senilis	287
Disease of external eye or eyelids	129
No vision	100
Cataract	99
Strabismus	96
Pterygium	93
Examination unsatisfactory or not visualized	64
Pupils—irregular	60
—unequal	105
—do not react to light	21
—do not react to accommodation	21
Arteriovenous nicking	46
Exophthalmus	31
Corneal scar	29
Cornea—cloudy	24
—ulcerated	2
Nystagmus	20
Increased physiological cupping	9
Blurring of disc; old retinitis *each*	8
Iridectomy; spasm retinal arteries *each*	5
Choroiditis and abnormal pigmentation	4
Cataract removed; increased tortuosity of retinal vessels; degeneration of macular area; pigmented retina *each*	3
Retina—hemorrhage	3
—exudate	7
—sclerosis	179
Iritis; widened palpebral fissures; corneal opacity; retinitis and myelinated nerve fibers; optic atrophy; detached retina; increased light reflex *each*	2
Absence inner border of iris; congenital palsy of eye; poliomyelitis residuals, extra-ocular muscles; pupils small; corneal ulcer under treatment; adhesions of iris, old injury; strabismus operation; pterygium removed; scar tissue over medial portion eyeball extending to border of cornea; large brown pigmented area, extending to iris; small foreign body inner globe, old injury; scattered pigmentation above supnasal vessels; inversion of lid; pale conjunctiva; subconjunctival hemorrhage; raised irregular shiny yellow plaques; central scotoma, history optic atrophy; choked disc; possible detached retina; pale optic disc and thinning of vessels; white line, retina; myelinization optic nerve; retina not seen due to corneal lesions; discolored sclera; weakness, medical rectus muscle *each*	1
Conjunctiva—ulcerated	0
—congested	118
—jaundiced	2
Edema of disc	0

RIGHT EAR

No abnormalities	19,816
Not examined	27
Cerumen present in unusual amounts	5,068
Impaired auditory acuity	2,590
Drums scarred	257
Drum perforated	174
Auditory canal abnormal	116
Mastoidectomy scar	90
Discharge present	66
Otitis externa	61
Eczema or fungus of canal	35
Drum—thickened	22
—retracted	60
—dull	40
Cholesteatoma	16
Calcified plaques; roaring or tinnitis; exudate present in canal *each*	10
Drum pale	9
Drum injected; opaque drums *each*	8
Eustachian salpingitis	7
Canal narrow	6
Drum inflamed	5
Canal inflamed; polyp of canal *each*	4
Multiple tophi	3
Abrasion of canal; cyst of canal; disfiguration of lobe; fenestration; exostosis; tympanum indistinct *each*	2
Drums irregular; drum edematous; congenital absence of outer ear; scarring and deformity outer ear; congested sensation present; canal dry; white patches on drums; congenital absence pinna; laceration of canal; drum milk white; external ear destroyed by burns; unable to see drum, fine cilia; congenital absence external ear and canal; contour of canal opening peculiar, irregular in cross sections; scar and deformity ear exit; scarring pinna; plastic surgery; abnormal canal configuration; swelling of canal; drum infected; cauliflower ear; drum scarred; excrescence medial tympanum *each*	1
Mastoid tenderness	0

Table I—Continued
Summary of the Findings on Physical Examinations on 27,718 Males During the Period June 26, 1953, to June 25, 1954

Left Ear

No abnormalities	19,815
Not examined	0
Cerumen present in unusual amounts	5,055
Impaired auditory acuity	2,648
Drum scarred	233
Drum perforated	159
Auditory canal abnormal	114
Mastoidectomy	90
Discharge present	61
Otitis externa	59
Eczema or fungus of canal	31
Drum—thickened	26
—retracted	79
—dull	34
Calcified plaque	13
Drum injected	12
Cholesteatoma	9
Tinnitis; opaque drums; eustachian salpingitis *each*	8
Drum inflamed	6
Canal narrow	5
Canal abnormally dry; exudate *each*	4
Polyp of canal; drum pale *each*	3
Cyst or papilloma canal; fenestration; plaques on drum; cauliflower ear; exostosis; bulging, or distortion of drum *each*	2
Deformity auditory canal; calcified plaques; incomplete plastic restoration; pedunculated mass upper canal; canal inflamed; fungus of drum; congenital absence outer ear; drum irregular; multiple tophi; frosting of drum; calcified drum; ear deformed; canal irritated; unable to see drum, fine cilia; drum swollen; drum lacks normal markings; no drum, explosion; contour of canal opening peculiar, irregular cross section; drum almost occluded by granulation of tissue; tumor of canal; draining due to furuncle of canal; granulation on drum, drum cystic; growth on pinna; tympanum indistinct; canal swollen *each*	1
Mastoid tenderness	0

Nose

No abnormalities	20,588
Not examined	17
Deviated septum—right	2,445
—left	2,247
Mucous membrane—congested	1,839
—ulcerated	23
—pale	49
Enlarged turbinates—right	1,605
—left	1,672
Polyps	118
Post-nasal drip	113
Perforated septum	74
Submucous resection; old fracture deformity	39
Nasal operation	16
Polypectomy; mucous membrane reddened or inflamed; nasal septum operation *each*	8
Rhinophyma	7
Mucoid discharge	6
Displaced cartilage; traumatic deformity *each*	5
Left anterior nares occluded by cartilage; septum irregular; narrow passage; turbinates atrophied *each*	4
Dry, smooth, mucous membrane; mucous membrane bluish *each*	3
Ulcer on septum; saddle nose; crooked nose *each*	2
Ozena; surgical drainage left antrum; about three-fourths ala removed; erythema mucous membrane; dry, discolored mucous membrane; enlarged nose, trauma and irregular septum; cracked bridge; turbinates swollen with obstruction; nares full and blocked by pus and mucous; small tumor projecting from septum; chronically inflamed tip of nose; mass on septum, three-eighths inches in diameter; serous discharge; complete obstruction, left nares; nose angles to right; nose flattened; scarring and deformity tip of nose; small bony nodule on septum; small tumor, septum; healed bleeding points each side of septum; broken septum; pedunculated growth, left nares; plastic repair of nose; injection nasal mucosa; turbinates partially removed; infected hair follicule; antritis; plastic operation, rib cartilage transplant; boggy turbinates; wart right nares; pale blue congested mucosa; growth right nostril *each*	1

Mouth

No abnormalities	16,421
Not examined	8
Teeth in poor repair	4,441
Dentures—partial	4,327
—complete	2,560
Gums—infected	1,031
—retracted	1,455
Edentulous	108
Metal line present	21
Malocclusion	10
Torus palatinus	9
Has complete dentures, does not wear them	5
Leukoplakia, inner cheek; leukoplakia, side of mouth, roof of mouth, and gums; Caldwell-Luc operation residuals; fibrous polyp, cheek *each*	2
Etched teeth; dental calculus; papilloma hard palate; congenitally missing eight teeth; calculus removed, submaxillary gland; cut inside lower lip; drainage, left lower molar; leukoplakia, roof of mouth; enlarged submaxillary duct; hyperemia of gums due to malocclusion; can open mouth one half of normal, weakness of mastication muscle, left; mouth is in extremely foul condition, calculus, food debris, etc.; small mouth, irregular teeth with undershot jaw; abnormal ridge roof of mouth; marked calculus behind lower teeth; ulcer on gum; all teeth being removed; skin tab over left upper incisor; enlargement of papillae of salivary glands; vascular tumor, inside cheek; surgery for carcinoma; lower half mandible removed; mass on hard palate; pea-sized nodule, right mandibular angle; mouth asymmetrical; old fracture of jaw; deformed left upper gum and hard palate; fracture deformity, alveolar ridge; periodontoclasia *each*	1

Tongue

No abnormalities	27,573
Not examined	4
Tremor of tongue	29
Atrophy of papillae	18
Geographic tongue	17
Lesions on tongue	13
Tongue deviated to right	8
left	8
Coated tongue	8
Fissured tongue; small growth, tip tongue *each*	3
"Beefy-red" tongue; edges rough and cracked *each*	2
Hemangioma of tongue; wart, tip of tongue; hairy tongue; caustic soda burn, tip of tongue; small tumor anterior left tongue; hypertrophied papillae; tongue gray; anesthesia, right side, due to gland removal; postoperative scar, tumor removed; elevated area in posterior sulcus; flap on tongue, old laceration; tongue dry and coated; tumor under tongue, fibroma?; thick and grooved tongue; marked ridges and media raphe; strawberry tongue; macroglossia; glossitis; papilloma on tongue; rounded hypertrophy, tip of tongue; right side of tongue numb from facial injection; thick tongue *each*	1

Throat

No abnormalities	11,955
Not examined	4
Tonsils—enlarged	968
—small	3,178
—cryptic	397
—infected	107
—removed	11,339
Tonsillar regrowth	199
Throat—infected	42
—congested	297
Papilloma of tonsils or soft palate	23
Lymphoid hyperplasia	22
Uvulectomy	16
Bifid uvula; elongated uvula *each*	12
Inflamed or reddened pharynx	10
Polyp on uvula; cleft palate repair *each*	7
Postoperative scarring of soft palate and pharynx	5
Uvula deviated	4
Polyp on tonsil; chronic hoarseness *each*	3
Soft palate—ulcerated	2
—perforated	1
Both fossa filled with adenoid tissue; drainage, posterior pharynx; anterior pillar obliterated by scar tissue; uvula	

Table I—Continued
Summary of the Findings on Physical Examinations on 27,718 Males During the Period June 26, 1953, to June 25, 1954

obliterated by scar tissue, and stretched flat; laryngectomy and tracheotomy, previous carcinoma; red spots, soft palate; cleft palate; wart, soft palate ..... *each* 2
Scarred pharynx and palate; congenital deformity of soft palate; follicular spots, tonsillar area; ulcerated pharynx; incomplete, cleft palate; grayish ulcer uvula; throat not examined, hyperactive gag reflex; leukoplakia, soft palate; vocal cord growth removed; small papillary growth, tonsillar fossa; small papule, uvula; fossa scarred; recurrent hoarseness, enlarged posterior pharyngeal glands; bluish color to mucous membrane, and prominence of veins in posterior pharynx; cyst nasopharynx; swelling, tonsillar region; high palate and nasal "twang" to speech; erythema of throat and mouth; tonsils flat; some paresis of right side of soft palate; superior pole of left tonsil contains yellowish cyst; mucous cyst, soft palate; yellow patch, right tonsil; congenital irregularity of roof of mouth, tumorous projection?; hard nodule, soft palate; wart-like growth, pharynx; pedunculated lymphoid tissue of tonsil; white patches, entire palate; wart-like growth, tonsil; pedunculated lesion removed from palate; uvula swollen and edematous; irritation of throat; some inflammation, posterior wall; granulated tissue of both fossa *each* 1

Neck

No abnormalities	25,757
Not examined	8
Thyroid—enlarged	90
—smooth	1,747
—nodular	242
—palpable	1,385
Thyroidectomy	68
Postoperative scar—glands removed	34
Pulsations in neck	6
Wryneck	5

Postoperative scar, cyst removed; postoperative scar, parotid tumor removed; postoperative scar, thyroid cystectomy; postoperative scar, phrenic crush, left; subcutaneous mass in neck ..... *each* 2
Postoperative scar, lymphosarcoma removed; postoperative scar, midline, vocal cord surgery; postoperative scar, branchial cyst removed; postoperative scar, arteriogram?; postoperative removal of growth on vocal cord (four operations); postoperative scar, wryneck repair; postoperative scar, thyroid nodule removed; postoperative scar, tuberculous glands removed; postoperative scar, pituitary tumor removed; postoperative scar, removal of raduim burn for mole; postoperative scar, over cricoid; opening to bronchial tube, larynx removed, carcinoma; cervical abscess scar; biopsy scar; jugular vein ligation; branchial cleft, left; carotid sinus syndrome; small draining sinus; possible thyroglossal cyst; small hard movable mass left anterior neck; firm palpable mass, probably recurrence of carcinoma of thyroid, surgery and radium *each* 1

Chest

No abnormalities	26,819
Not examined	2
Rales present	177
Breath sounds abnormal	162
Chest—asymmetrical	132
—flat	203
—barrel shaped	117
Empyema scar	58
Funnel breasted	55
Fremitus abnormal	38
Resonance abnormal	33
Thoracotomy scar	27
Pigeon breasted	19
Rib resection	13
Shoemaker's chest	9
Lobectomy	7
Deformed chest	5
Pneumonectomy	4
Pneumonectomy for carcinoma of lung; postoperative scar, removal rib cartilage ..... *each*	3
Lung abscess scar	2

Chicken breasted; subscapular scar left chest; pleurisy scar; diaphragmatic hernia; postoperative scar, tumor removed from rib; postoperative scar thoracic, cardiomyotomy; 14-inch scar left chest; two ribs removed, shrapnel wound; postoperative scar, cyst of lung removed; atrophied right pectoralis major, birth injury; postoperative scar, coarctation of aorta; cartilage transplant scar; incision and drainage abscess upper chest; prominent upper sternum; atrophied muscles, posterior chest; Harrison's groove; postoperative scar, mediastinal tumor removed; postoperative scar, pneumonia; postoperative scar, unspecified ..... *each* 1

Breasts

No abnormalities	24,695
Not examined	2,879
Accessory nipples	56
Gynecomastia	23
Cyst removed	15
Tumor—right	10
—left	9
Mastectomy	4
Tenderness—right	3
—left	4
Nipples inverted	3

Enlarged breasts; postoperative scar, unspecified ..... *each* 2
Congenital hypertrophy; hard nodule, left breast; scar, unspecified, left breast; bilateral mastectomy, and fat removal; postoperative scar, tuberculous gland removed; removal of nipple and areola; pendulous breast, with feminine appearing areola; small, round, movable mass, right breast; biopsy scar; retracted nipples; breasts "full" (cortisone?); hairy mole, nipple; breast scar, nipple absent; nipple operated, scar present; mastitis ..... *each* 1

Heart

No abnormalities	25,003
Not examined	209
Apex beat not palpable	1,868
Murmur—systolic	810
—diastolic	40
—presystolic	28
—others	2
Apex beat outside mid-clavicular line	259
Extrasystole	203
Rhythm irregular	148
Heart sounds—forceful	84
—distant	204
—reduplicated	71
Thrills present	27
Fibrillation	23
Palpable, peripheral blood vessels—beaded	20
—sclerotic	145
—tortuous	48

Spine

No abnormalities	26,388
Not examined	31
Lumbar spine abnormal	700
Thoracic spine abnormal	699
Postoperative scar, herniated disc operation	96
Sacral spine abnormal	53
Decreased lumbar curve	49
Cervical spine abnormal	34
Spinal fusion	24
Herniated disc	19
Laminectomy scar	14
Postoperative scar, lumbar spine	8
Sympathectomy scars; increased lumbar curve ..... *each*	7
Hairy patch at lumbosacral junction	6
Large abscess scar	4

Postoperative scar, lumbosacral spine; postoperative scar over sacrum ..... *each* 3
Postoperative scar, lumbar spine; scar, spina bifida; spina bifida occulta; coccyx removed ..... *each* 2
Scar lumbar area; postoperative scar, bone graft; spurring anterior surface L-4; postoperative scar, sacroiliac joint; coccyxgeal cyst removed; postoperative scar, coccyx; postoperative scar, melanoma removed, T7 and T8; postoperative scar, lumbosacral, benign cord tumor removed; partial spina bifida; old fracture, spotty anesthesia, saddle type; prominent dorsal lumbar process; flattened cervical process, old fracture; postoperative scar, thoracic, tuberculous vertebrae; postoperative scar, displaced disc and bone graft; poker spine; limited muscle coordination of back; postoperative scar, fascia lata; postoperative scar above ilium; postoperative scar lumbar spine, gunshot wound; deformity of coccyx; scar, thoracic area,

TABLE I—CONTINUED
SUMMARY OF THE FINDINGS ON PHYSICAL EXAMINATIONS
ON 27,718 MALES DURING THE PERIOD JUNE 26, 1953, TO JUNE 25, 1954

muscle abscess; compressed cervical disc; paravertebral muscles on left more developed than on right; postoperative scar, exploratory operation; hypertrophy, ligamentum nuchae; old fracture, lumbar process; flattened lumbar curve, osteoarthritis; scar midline over coccyx; wears sacroiliac brace; postoperative scar lumbar area, removal of nucleus pulposus; postoperative scar, cervical region; cervical disc; prominent spinous process; postoperative scar; scalenus anticus syndrome; postoperative scar, thoracic area, removal of osteochondroma; postoperative scar, sacrum and lower lumbar ..... *each* 1

ABDOMEN

No abnormalities	22,064
Not examined	50
Postoperative scars	5,154
Tenderness present	205
Liver enlarged	126
Umbilical hernia	85
Nephrectomy	48
Incisional hernia	31
Spleen palpable	27
Pulsations present; tension present ..... *each*	25
Kidney tender—right	18
—left	13
Nephrotomy	12
Splenectomy	9
Diastasis recti; relaxed abdominal wall ..... *each*	8
Colostomy, not specified as carcinoma; striae ..... *each*	7
Postoperative scar, kidney calculi removed; some umbilical weakness ..... *each*	6
Tumor; colostomy, carcinoma ..... *each*	5
Ureterotomy	4
Nephropexy; epigastric hernia; hiatus hernia; kidney scar, abscess; bladder tumor removed ..... *each*	3
Scar over kidney; cyst, abdominal wall; wears abdominal brace, abdominal atrophy, polio residuals ..... *each*	2
Indistinct tumor, region of cecum; abdominal glands resected; sympathectomy for vasospasm of leg; discoid lesion on postoperative scar; small nodule in rectus muscle; accessory nipple near umbilicus; colectomy; palpable, descending colon; pyelotomy and partial nephrectomy; brown papillomata, superimposed in postoperative scar; carcinoma of ascending colon; sigmoid palpable; liver edge smooth; palpable mass, right upper quadrant; mass, region of cecum; ureteral stone removed; liver felt on deep inspiration, slightly tender; abdominal tension poor; ureteral adhesions, operation for; tenseness, abdominal muscles; double kidney; keloids, appendectomy scar; superficial blood vessels outline lower border of liver; weakening of upper abdominal wall; hypertrophic, pyloric stenosis scar; shrapnel wound, spleen removed, colostomy closed; recurrent incisional hernia, tantalum grid broken—there is a wound from which particles of wire frequently extrude; questionable mass, smooth, round, movable right upper quadrant; incision and drainage perirenal abscess; questionable oblong mass left lower quadrant; hard, nodular tumor, left lower quadrant; scaphoid tender; abdominal ptosis; kidney scar, ptosis; ruptured liver repair scar; laparatomy, gunshot wound; aberrant navel; visceroptosis ..... *each* 1

INGUINAL REGION

No abnormalities	26,045
Not examined	115
Relaxed rings—right	2,284
—left	2,216
Herniotomy—right	1,311
—left	1,039
Inguinal hernia—right	368
—left	313
Hydrocele—right	114
—left	102
Undescended testicle	79
Varicocele—right	76
—left	854
Hernia, trussed	62
Orchidectomy	59
Absent testicle	38
One testicle abnormally smaller than the other	26
Varicocelectomy; hydrocelectomy; scrotal cysts ..... *each*	24
Cyst of testicle	13
Spermatocele	11
Enlarged testicle; testicles abnormally small; cyst of epididymus; scars in groin, unspecified; short spermatic cord ..... *each*	8
Femoral hernia—right	7
—left	6
Mass in scrotum; vasectomy ..... *each*	7
Operation for undescended testicle	6
Nodule, lower pole of testicle; scar, scrotum; nodule, epididymus; thickened epididymus; verruca of penis; hypospadias or phimosis; redundant prepuce ..... *each*	5
Nodule above testicle; palpable mass, upper pole testicle; enlargement of epididymus; bubo scars; scar groin, incision and drainage abscess; thickened cord ..... *each*	4
Testicle sensitive	3
Orchidectomy for tumor; nodule, upper pole of testicle; thickened tunica of testicle; previous operation on testicle; cyst removed from testicle; small mass right testicle; scrotal warts; epididymis repair; mass, epididymis; epididymitis; nodule on spermatic cord; cyst, or fistula, gluteal area; postoperative scar penis; cyst spermatic cord; small mass, right spermatic cord; thin muscle walls, inguinal regions; biopsy scar; infantile genitals ..... *each*	2
Firm, irregularity of testicle; testicle swollen; testicle stony hard and nodular; underdeveloped testicles; scrotum underdeveloped, testicles not palpable; testicle soft; fibroma removed from testicle; accessory testicle, left; mass attached to left testicle; testicle abnormally high; chronic orchitis; small and high right testicle; scar of scrotum, and mass behind left testicle; vitiligo, penis and scrotum; edema of scrotum and penis; flat ulcer underside of scrotum; numerous small dilated blood vessels of scrotum; varicies of scrotum; scrotal cysts, removed; atrophy of penis, scrotum non-dependent, and one testicle; soreness, vessels of scrotum, post epididymitis; cyst removed from epididymis; epididymis indurated, old epididymitis; postoperative scar femoral aneurysm; accessory nipple, groin; scar, right groin, and depigmentation of adjacent skin; inguinal glands resected; morula penis; congested seminal vesicle; leukoderma penis; sparse pubic hair; urethral gland excised; small genitalia, sterility; non-pigmented naevi penis; cyst on groin; firm, hard, freely movable, very tender mass, olive shaped in inguinal area; varicosities of penis; repair of hypospadias; transurethral resection; Von Recklinghausen masses on penis; postoperative scar, lympoma over right inguinal area, hard glands on left; non-reducible mass, femoral canal, hernia or hydrocele?; bilateral bulge, generalized and not through rings; epididymis, and tender cord; scar on penis; sebaceous cyst, penile skin; penile operation, and radium treatment (carcinoma?); multiple naevi, genitalia *each*	1

RECTUM

No abnormalities	4,109
Not examined	10,924
External hemorrhoids—absent	14,906
—present	1,837
Internal hemorrhoids—absent	5,993
—present	363
Prostate—normal	5,111
—hypertrophied (generalized)	506
—tumor	8
Pilonidal cyst, sinus, or dimpling	193
Pilonidal cystectomy	108
Pruritus ani	95
Sphincter tone abnormal; fistulectomy or fissurectomy *each*	41
Fissure, fistula	31
Rectal polyp	21
Prostatectomy	16
Nodule (s)—prostate	13
Ischiorectal abscess scar	12
Indurated area prostate; tenderness, either lobe; prostate abnormally small ..... *each*	4
Some irregularity of rectum, unclassified; anal warts *each*	3
Occasional bleeding of rectum, cause unspecified; prostate tender; scarring and redness anally from previous pruritus; hypertrophied rectal papillae; redundant anal skin fold ..... *each*	2
Anus constricted; operation, fistulectomy and stricture; granulamatous prostate; macerated mucous membrane; skin tab near anus; discharge from rectum; operation for rectal prolapse ..... *each*	1

REFLEXES—RIGHT

Patellar—present	25,521
—absent	144
Triceps—present	18,781

Table I—Continued
Summary of the Findings on Physical Examinations on 27,718 Males During the Period June 26, 1953, to June 25, 1954

—absent	204
Cremasteric—present	17,491
—absent	53
Epigastric—present	16,720
—absent	178
Rhomberg—present	20
—absent	21,256
Ankle clonus—present	6
—absent	13,401

Reflexes—Left

Patellar—present	26,513
—absent	150
Triceps—present	18,776
—absent	210
Cremasteric—present	14,491
—absent	71
Epigastric—present	16,723
—absent	185
Rhomberg—present	11
—absent	21,606
Ankle clonus—present	6
—absent	13,406

Adenopathy

Cervical—present	681
—absent	24,467
Maxillary—present	594
—absent	26,556
Inguinal—present	163
—absent	25,219
Axillary—present	146
—absent	25,598
Epitrochlear—present	32
—absent	25,787

Table II.
Blood Pressure Findings
(Same Group, 27,718 Males, as Table I)
Diastolic

Systolic	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	100-104	105-109	110-114	115-119	120-124	125-129	130 or over
79 or under								1												
80-89					2	1														
90-99		2		42	17	214	98	141	14	1										
100-109			1	44	37	382	312	543	109	61	4	4								
110-119		1	1	37	35	529	599	2,794	952	938	96	27	3							
120-129		2		22	16	241	301	2,094	1,436	3,543	701	259	17	7	2					
130-139				4	5	62	115	751	637	2,192	942	767	127	51	2	1				
140-149	1			1	3	17	26	215	188	729	501	717	230	161	18	11		1		
150-159					1	6	4	37	62	171	153	330	147	156	30	29	2	3		
160-169	1			1		3	1	10	22	80	75	166	92	204	30	70	8	15		2
170-179				1		2		4	4	12	16	39	26	76	21	37	6	8		1
180-189								3		7	7	18	13	38	11	13	7	11	1	
190-199								1	1	3	1	5	5	9	1	20	7	17		4
200-209								1		2	1	6	1	9	2	9	3	5	2	4
210-219												1	1	2	1	8	1	3		5
220-229														1	1	4		4	2	4
230-239																		2	1	2
240-249																	1	1		4
250 or over																		1		2

Blood pressure not recorded 105

Table III.
Summary of the Clinical Diagnoses Recorded on 27,718 Male Health Examinations During the Period June 26, 1953, to June 25, 1954

No Clinical Diagnosis	16,719
Infectious and Parasitic Diseases	
Paratyphoid fever	1
Tuberculosis of the genito-urinary system	1
Arrested or inactive tuberculosis, non-respiratory	8
Influenza or grippe	3
Dysentery (unqualified)	12
Poliomyelitis history	56
Syphilis	46
Gonococcus infection and other venereal diseases	10
Malaria fever, type of parasite unknown or not specified	14
Ringworm	256
Other mycoses	33
Cancers and Other Tumors	
Cancer and other malignant tumors of the buccal cavity and pharynx	4
Cancer and other malignant tumors of the digestive tract and peritoneum	5
Cancer and other malignant tumors of the respiratory system	4
Cancer and other malignant tumors of the male genito-urinary organs	4
Cancer and other malignant tumors of the skin	24
Cancer and other malignant tumors of the thyroid	2
Cancer and other malignant tumors of other organs	5
Non-malignant (benign) tumors of other or of unspecified organs	665
Tumors of other or of unspecified organs, nature of tumor unspecified	3

Rheumatic Diseases, Nutritional Diseases, Diseases of the Endocrine Glands and Other General Diseases	
Rheumatism (unqualified)	9
Sciatic rheumatism	36
Arthritis, atrophic, deformans, rheumatoid	33
Arthritis, infectious	1
Arthritis, traumatic	5
Arthritis, hypertrophic, osteoarthritis	52
Arthritis (unqualified)	190
Arthritis, other (bursitis)	136
Gout	8
Diabetes, (mellitus or unqualified) not using insulin	10
Diabetes, (mellitus or unqualified) using insulin	59
Diabetes, (mellitus or unqualified) unknown as to use of insulin	61
Diseases of the pituitary body	13
Goiter (unqualified)	3
Simple goiter	4
Adenomatous goiter	3
Thyrotoxicosis, exophthalmic goiter	2
Hypothyroidism	10
Obesity	2,711
Diseases of the Blood and Blood-Making Organs	
Pernicious or primary anemia	4
Secondary anemia	1
Anemia (unqualified)	95
Hodgkin's disease	2
Lymphatic leukemia	1

TABLE III—CONTINUED
SUMMARY OF THE CLINICAL DIAGNOSES RECORDED ON 27,718 MALE HEALTH EXAMINATIONS DURING THE PERIOD JUNE 26, 1953, TO JUNE 25, 1954

CHRONIC POISONINGS AND INTOXICATIONS	
Alcoholism, acute or chronic	3
Chronic poisonings by mineral substances	2
DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE	
Encephalitis, non-epidemic, history	4
Spastic paralysis from birth or early infancy	4
Other spastic paralysis	50
Tremors of hands, head, legs, etc.	95
Cerebral hemorrhage (apoplexy), embolism, thrombosis, softening of the brain	15
Paranoia	1
Dementia praecox	1
Epilepsy	12
Convulsions	2
Neuralgia, neuritis	44
Nervousness, nervous condition	120
Neurasthenia, nervous exhaustion, nervous breakdown, nervous prostration	6
Anxiety reaction	12
Psychoneurosis	12
Depression	3
Glaucoma	2
Otitis media	136
Ear abscess or inflammation, discharging ear, infected ear, earache	40
Other or unspecified diseases of the ear	2
Diseases of the mastoid process	1
DISEASES OF THE CIRCULATORY SYSTEM	
Pericarditis	2
Endocarditis, chronic, aortic valve, including insufficiency	19
Endocarditis, chronic, mitral valve, including insufficiency and stenosis	39
Endocarditis, chronic, valve not specified, other valvular disease	17
Myocarditis	8
Aortitis	1
Angina pectoris	55
Aneurysm	1
Diseases of the coronary arteries	35
Auricular fibrillation	22
Enlarged heart	35
Heart trouble (unqualified)	21
Coronary occlusion, thrombosis, myocardial infarction	122
Sclerosis of coronary arteries	3
Arteriosclerosis without high blood pressure	62
Arteriosclerosis with high blood pressure	48
Diseases of arteries (mesenteric duodenal occlusion)	1
Diseases of the veins	10
Varicose veins or ulcers	849
Phlebitis	32
Epistaxis	7
Hemorrhage without specified cause	3
Swollen or infected glands (unqualified)	1
Other diseases of the circulatory system	3
DISEASES OF THE RESPIRATORY SYSTEM (INCLUDING DISEASES OF THE PHARYNX	
Coryza, rhinitis, head cold (unqualified)	115
Catarrh of nose	2
Sinusitis	252
Laryngitis and other diseases of the larynx	12
Bronchitis, acute	6
Bronchitis, chronic	16
Bronchitis, unspecified	87
Bronchiectasis	7
Pleurisy	1
Pleurisy history	37
Asthma	106
Hay fever	109
Asthma and hay fever	18
Other allergies	11
Pulmonary emphysema	19
Pulmonary embolism and thrombosis	1
Lobectomy	7
Pneumonectomy	4
Pneumothorax	3
Thoracoplasty	1
Cold (unqualified)	39
Upper respiratory infection	144
Tonsillitis	33
Quinsy, tonsillar abscess	1
Pharyngitis, pharyngitis with cold	84
Septic sore throat, streptococcic sore throat	1
Sore throat (unqualified)	9
Cold and cough, cough (unqualified)	31
DISEASES OF THE DIGESTIVE SYSTEM	
Diseases of the teeth and gums, including toothache, abscessed or infected teeth, pyorrhea	122
Ulcer of the stomach or duodenum	459
Gastric neurosis, intestinal neurosis, nervous indigestion	34
Indigestion, dyspepsia, gastritis, upset stomach, digestive disturbance, nausea, etc.	200
Stomach trouble (unqualified)	68
Other diseases of the stomach—duodenitis, pyloric spasm	7
Enteritis or colitis, ulcerative	5
Enteritis or colitis, mucous	3
Enteritis or colitis (unqualified)	77
Other diseases in this class, including diarrhea, diverticulosis	26
Appendicitis (unqualified)	2
Appendicitis specified as acute	1
Appendicitis specified as chronic	1
Constipation	34
Splanchnoptosis, visceroptosis, abdominal ptosis	3
Abscess, fistula, fissure or ulcer of the anus or rectum, pruritus ani	143
Prolapse of anus or rectum	1
Other diseases in this class, including anal stricture	4
Cirrhosis of the liver	8
Jaundice	2
Liver trouble (unqualified)	2
Other diseases of the liver, including hepatitis	41
Biliary calculi, gall stones	8
Cholecystitis, inflammation of the gall-bladder	8
Other diseases of the gall-bladder and biliary passages	30
DISEASES OF THE GENITO-URINARY SYSTEM (NON-VENEREAL)	
Acute nephritis	1
Chronic nephritis	3
Nephritis (unqualified)	14
Pyelitis	7
Kidney trouble (unqualified)	21
Other diseases of the kidneys	8
Calculi of the urinary passages	137
Cystitis, inflammation of the bladder	13
Stricture of the urethra	1
Other diseases of the urethra	3
Other diseases of the bladder	4
Prostatitis	89
Orchitis	2
Atrophied testicles	278
Male climacteric	1
DISEASES OF THE BONES AND ORGANS OF LOCOMOTION	
Osteomyelitis	4
Other diseases of the bones, except tuberculosis	2
Diseases of the joints, except tuberculosis, rheumatism and arthritis	26
Lumbago	28
Stiff neck, myalgia, myositis, other muscular pains (unqualified)	32
Bunion	15
Flat-foot	425
Muscular atony, atrophy and other diseases of the muscles	181
Acquired deformities, other diseases of the organs of locomotion, including scoliosis, kyphosis, lordosis	959
CONGENITAL MALFORMATIONS AND DISEASES OF EARLY INFANCY	
Congenital malformations of the heart	3
Cleft palate	5
Pilonidal cyst	181
Supernumerary breasts	59
SENILITY	
Senility	5
ILL-DEFINED	
Debility, asthenia, fatigue, overwork, run-down condition, exhaustion	47
Headache, including nervous or sick headache	195
Backache, pain in back, lame back	356
Pain in side, leg, foot, shoulder, etc.	191
Dizziness, vertigo, faintness, dyspnea	81
Abdominal pain or trouble (unqualified)	22
Allergy (unqualified)	8
Chills and fever	1
Cramps (unqualified)	1

Table IV.

Summary of the Number of Cases with Lost or Impaired Members or Parts of the Body Based on 27,718 Male Health Examinations During the Period June 26, 1953, to June 25, 1954

Lost or Impaired Members or Parts of the Body	
Eye	
Blind in or lost right eye	96
Blind in or lost left eye	99
Blind in or lost both eyes	1
Ear	
Deaf, either one ear or both	103
Deaf and dumb	2
Speech defect, stammering	24
Finger or thumb of right hand	
Lost thumb	19
Lost thumb and one or two fingers	4
Lost thumb and three or four fingers	1
Lost one or two fingers	111
Lost three or four fingers	10
Impaired thumb	12
Impaired thumb and impaired one or more fingers	2
Impaired one or more fingers	190
Finger or thumb of left hand	
Lost thumb	17
Lost thumb and one or two fingers	9
Lost one or two fingers	117
Lost three or four fingers	8
Impaired thumb	19
Impaired thumb and impaired one or more fingers	2
Impaired one or more fingers	135
Finger or thumb of both hands	
Impaired both thumbs	10
Impaired fingers both hands	39
Lost right thumb and one finger left hand	1
Impaired left thumb and one or more fingers either hand	1
Lost one or more fingers left hand and impaired one or more fingers right hand	4
Impaired right thumb and one or more fingers either hand	1
Toe	
Lost one or more toes either or both feet	27
Impaired one or more toes either or both feet	28
Hand	
Lost left hand	2
Impaired right hand	10
Impaired left hand	15
Impaired both hands	7
Arms	
Lost right arm	5
Lost left arm	4
Impaired right arm	25
Impaired left arm	26
Impaired both arms	3
Foot	
Lost one foot (either right or left)	3
Impaired one foot (either right or left)	25
Impaired both feet	2
Leg	
Lost one leg (either right or left)	20
Lost both legs	1
Impaired one leg (either right or left)	116
Impaired both legs	2
Hand and leg	
Lost right hand and right leg	1
Arm and leg	
Impaired left arm and one leg	2
Trunk and head impairments, except joints	
Impaired spine	123
Unable to open mouth 33%	1
Impaired other or unspecified trunk	2
Impaired joints (right or left)	
Impaired shoulder	59
Impaired elbow	147
Impaired wrist	50
Impaired hip	30
Impaired knee	72
Impaired ankle	50
Impaired two or more joints of arm	2
Impaired two or more joints of leg	1

Table V.

X-Ray Diagnoses Based on 23,502 Male Health Examinations During the Period June 26, 1953, to June 25, 1954

Tuberculosis, active, of the respiratory system	7
Suspected active tuberculosis of the respiratory system	24
Arrested or inactive tuberculosis of the respiratory system	297
Calcified primary complex, ghon	1,902
Fungus infection	57
Cancer and other malignant tumors of the respiratory system	4
Cysts—air cysts, Boeck's sarcoid	27
Bronchitis, unspecified	32
Bronchitis, chronic	16
Bronchiectasis	25
Old pleuritis	98
Pulmonary emphysema	71
Silicosis	8
Pneumoconiosis other than silicosis and asbestosis	14
Lung abscess	1
Pneumothorax	4
Lobectomy	6
Pneumonectomy	6
Thoracoplasty	1

Table VI.

Laboratory Studies

Kahn Test—Total number	13,282	99-90	2,906
Negative	13,157	89-80	6,119
Positive	46	79-70	7,505
Doubtful	79	69-60	154
Urinalysis—Total number examined for albumin and sugar only	26,205	59-50	12
Albumin—absent	25,175	49-40	7
—present	1,030	39 and below	1
Sugar—absent	25,656	Blood Count—White Blood Cells and Red Blood Cells	
—present	549	—Total number *R.B.C.* counts	5,793
Urinalysis—Total number microscopic examination	4,720	5,000,000 and over	979
W.B.C.—absent	253	4,999,999-4,500,000	2,893
—present (1-15 cells/H.P.F., males 1-40 cells/H.P.F., females)	4,384	4,499,999-4,000,000	1,780
—marked amount (over 20 cells/H.P.F., males over 40 cells/H.P.F., females)	83	3,999,999-3,500,000	116
R.B.C.—absent	2,723	3,499,999-3,000,000	11
—present (1-10 cells/H.P.F., males or females)	815	2,999,999-2,500,000	10
—marked amount (over 10 cells/H.P.F., males or females)	24	2,499,999-and under	4
Casts absent	2,725	—Total number *W.B.C.* counts	12,008
Granular cast present	168	6,999 and under	5,578
Hyaline casts present	405	7,000- 9,999	5,065
Other casts present	145	10,000-19,999	1,355
Bile present	5	20,000-29,999	8
Blood Count—Total number *hemoglobin* readings	17,956	30,000 and over	2
% grams		Blood Count—Total number *of differentials*, done	1,872
100 and over 17. and over	1,252	Polymorphonuclears 59% and under	734
16.9-15.1	2,906	60%-75%	1,030
15. -14.1	6,119	76% and over	105
14. -12.1	7,505	Lymphocytes 19% and under	172
12. -10.1	154		
10. - 8.1	12		
8. - 6.1	7		
6. - and below	1		

TABLE VI—CONTINUED
LABORATORY STUDIES

20%-30%	680
31% and over	1,004
Monocytes 4% and under	1,079
5%-10%	480
11% and over	298
Eosinophils 0-1%	823
2%-5%	846
6% and over	117
Basophils 0-1%	1,701
2% and over	130
Myelocites—present	8
Metamyelocites—present	19
Lymphoblasts—present	2

Summary

A STATISTICAL summary of 27,718 male health examinations has been recorded. These health examinations were coded, put on punch cards, and were taken over a one-year period.

Based on the nature and variety of the above findings, we believe that the physical examination serves a definite need, in industry at least, and quite possibly for the population at large. A careful history, before employment, as well as keeping this history up-to-date, particularly as concerns genetics (family history), past history, symptoms, and signs, is a most potent adjunct in the study, evaluation, and practical application of health examinations in industry.

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"The Whole Is Greater Than Its Parts"

IN THE past 50 years many changes have taken place in the practice of internal medicine—changes that have been revolutionary. Within the memory of doctors still in practice, these changes are perhaps most in evidence in the emphasis now placed on laboratory findings. In the earlier years, laboratory findings played a minor role in diagnosis. Urinalysis was about the sum total of laboratory procedures. Blood counts and bacteriological findings were largely confined to medical centers and were seldom employed in private practice. In recent years so great is the emphasis placed on laboratory findings one is forced to conclude that history taking and bedside observations have, unhappily, been shifted to a secondary role. The x-rays, the fluoroscopic apparatus, the electrocardiographs, the sphygmomanometer, the hemocytometer, and the ballistocardiograph, together with such new techniques as catheterization of the heart and great blood vessels, the direct visualization of the stomach, the rectum, and the sigmoid, the peritoneal and plural cavities, together with blood chemistry—all have contributed to the complexity of modern diagnosis. The application of these techniques has led to the partitioning of internal medicine into many sub-specialties including neurology, gastroenterology, endocrinology, allergy, infectious diseases, arthritis, diabetes, diseases of metabolism, cardiology, and tuberculosis. May it not be that this diversity in practice will lead to failure to view the body in its entirety and the patient as an individual?

—From "The Nebraska Doctor," by PALMER FINDLEY, M.D., in *Nebraska State Med. J.*, January, 1955.

Occupational Health Nursing Services

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THE PRESENT concept of occupational health has developed chiefly from in-plant programs serving the health needs of workers in large manufacturing plants. Some of these are administered by a full-time Medical Director and his team of physicians, nurses, engineers, and allied personnel who conserve and promote the health and effectiveness of workers at their place of employment. Other programs are staffed by part-time physicians and one or more full-time nurses. Frequently, in-plant services employ one full-time nurse who receives her medical supervision from an on-call physician. In addition there are cooperative and part-time programs where the nurse, physician, or both serve one or more industries on a part-time basis.

There are approximately 12,000 nurses employed full time by industry in the United States.[1] The study* reported here was undertaken to determine the distribution of occupational health nurses and to gain further insight into the types and sizes of places of work covered by in-plant health programs. From this information, conclusions may be drawn about the unmet needs for occupational health services in this country.

Background

OVER the years, surveys have been made of the number of companies with in-plant health programs. "A preliminary Survey of Industrial Hygiene in the U.S."[2] published in 1940, was the first comprehensive report on the industrial hygiene problems of the nation. The National Association of Manufacturers has also conducted several surveys. Its 1951 survey[3] reported in conjunction with the 1950 survey by the American College of Surgeons includes information about 3,589 member companies. About 70% (2,518) of these employed up to 500 workers. Graduate nurses were employed by 267, or 10.6%, of these small companies. There were 1,022 manufacturing plants with more than 500 employees. Seven hundred and forty-seven of these, or 73.1%, had a nurse on duty in the plant.

A 1951 survey[4] of 100 industrial organizations employing 1,000 or more workers found that all employed nurses. Few reports are available on nursing services provided in establishments with less than 100 workers. However, the information available suggests that full-time nurses are rarely, if ever, employed by concerns with less than 100 employees. Even part-time nursing service is seldom found. The 1950 survey[5] by the National Organization for Public Health Nursing lists 33 non-official public health agencies providing part-time nursing service to small plants. Of the 52 plants receiving these part-time services only four employed less than 100 people.

Although many of the surveys have been limited to organizations known to have in-plant health programs, a real contribution has been made of information about types of programs, number and variety of personnel, and the kinds of activities they perform. Little is known about the number and size of industrial establishments and the number of workers that do not have an in-plant health service, nor are there comprehensive published reports on these matters for industries other than manufacturing.

Methods of Study

INFORMATION about the number of workers in this country and the number, types, and sizes of establishments employing them is available.[6] The unknown factors are the number of nurses and where they are employed. Certain nurse consultants in official agencies have these facts.

Questionnaires were sent to the occupational health or public health nursing consultants of 41 official health and three official labor departments. Each consultant was asked to list the number of occupational health nurses employed by both large and small companies in her area. Thirty-six of the 44 questionnaires were returned. Relatively complete information about the occupational health nurses in their areas was reported by 22 consultants. It is possible that certain differences exist in these reports, because the small establishment was defined differently in different places and because the censuses of occupational health nurses were done at different times and by a variety of methods. In all 22 areas the information reported by the consultants and used in this report was the most recent and most complete available. Data relative to the number of workers, and the number, types, and sizes of establishments employing them were obtained from the publication, *County Business Patterns*, 1951.

Results

ACCORDING to the 1950 census report[7] there were 24,458,771 persons in the total labor force in

*The authors wish to acknowledge the assistance of all nursing consultants who shared with them information about occupational health nurses in their area. Their interest and cooperation have made this report possible.

the 21 states and the Territory of Hawaii included in this study. In 1951, 16,443,658 people were employed in these areas by establishments coming under the provisions of the Old-Age and Survivor's Insurance program.[6] This represented 43% of the labor force under this program in the United States. Six thousand one hundred and ninety-four nurses, or 56% of the total occupational health nurse population in the United States, were reported to be employed in these 22 areas.

In order to estimate what part of the labor force covered by OASI had access to in-plant nursing services and to compare different areas it was decided to use the ratio, workers per nurse as an index. Dividing this labor force of 16,443,658 by the total occupational health nurse force of 6,194 there was a ratio of 2,654 workers per occupational health nurse for the 22 areas as a whole. The ratios for each of the areas are shown in Table I. These varied from 1,285 workers per nurse in Connecticut to 12,840 workers per occupational nurse in Florida.

All Establishments

THE 16,443,658 workers in these 22 areas were employed in 1,242,195 establishments. Table I shows that 99.7% of these establishments employed 0 to 499 workers. Of these small industries, only 1,063, or .09%, had a nurse on duty in the plant. More of the small plants in Connecticut, Delaware, and Rhode Island had a nurse on duty than did the small plants in any other area. Of the 3,323 large establishments 2,003 were reported as having one or more nurses. Thus 60.3% of the large plants had nurses in contrast to the .09% of the small plants. Only one state, Minnesota, reported that all of its plants with 500 or more workers employed one or more nurses.

The ratio of workers per nurse was related to the ratio of small plants per large plant. Connecticut with the low ratio of 1,285 workers per nurse, had the lowest small plant per large plant ratio, namely, 224:1. Florida, with 12,840 workers per nurse, had 931 small plants for every large plant. With few exceptions a similar pattern prevailed elsewhere.

Manufacturing Establishments Alone

WHEN the ratio of workers per occupational health nurse was computed for manufacturing establishments alone, it was found to be 1,389 workers per nurse. This was about half of the ratio found for all industry. Table II gives this data for manufacturing establishments in the 22 areas. West Virginia, with 135,638 workers in manufacturing establishments and 160 occupational health nurses, had the lowest ratio, namely, 848 workers per occupational health nurse. Among manufacturing industries there were proportionately fewer small establishments than in all industries, the ratio of small plants per large plant being 58:1 among manufacturing industries in contrast to 373:1 for all industries.

In the areas where the ratio of workers per nurse in manufacturing establishments was low, the ratio of small plants per large plant was usually low. The exceptions were in Minnesota and Pennsylvania. In no state of this 22 area survey did 5% of the small manufacturing estab-

TABLE I.
ALL INDUSTRY
NUMBER OF WORKERS[1] AND OCCUPATIONAL HEALTH NURSES EMPLOYED IN 22 AREAS AND THE PERCENT OF SMALL AND LARGE[2] ESTABLISHMENTS IN ALL INDUSTRY THAT EMPLOY NURSES

Areas	Workers[A]	OH[B] Nurses	Workers Per Nurse	Small Establishments Total[A] Estab.	Small Establishments With Nurses No.[B]	Small Establishments With Nurses %	Large Establishments Total[A] Estab.	Large Establishments With Nurses No.[B]	Large Establishments With Nurses %	Number of Small Plants for Every Large Plant
Colorado	276,595	66	4,191	28,834	11	0.03	35	18	51.9	824
Connecticut	701,343	546	1,285	43,428	107	0.25	194	188	96.9	224
Delaware	106,514	79	1,348	6,923	20	0.29	25	16	64.0	277
Florida	642,011	50	12,840	64,248	5	0.01	69	17	24.6	931
Georgia	676,603	194	3,488	48,496	36	0.07	139	84	60.4	349
Hawaii	89,851	35	2,567	7,564	19	0.25	20	12	60.0	378
Indiana	1,128,644	620	1,820	71,635	71	0.09	260	165	63.5	276
Iowa	461,897	132	3,499	54,461	14	0.03	68	40	58.8	801
Maine	205,942	62	3,322	19,127	15	0.08	43	24	55.8	445
Minnesota	608,145	209	2,910	57,332	12	0.02	98	98	100.0	585
Missouri	970,820	355	2,735	77,690	67	0.09	169	133	78.7	460
Nevada	37,357	14	2,668	4,356	3	0.07	4	0	0.0	1,089
New Hampshire	141,638	57	2,485	12,008	23	0.19	31	19	61.3	387
New Mexico	104,058	9	11,562	12,091	2	0.02	11	0	0.0	1,099
New York	4,799,487	1,439	3,352	372,330	243	0.06	871	496	56.9	427
Pennsylvania	3,131,193	1,142	2,742	182,308	180	0.10	749	340	45.4	243
Rhode Island	263,316	102	2,582	16,137	43	0.26	71	42	59.2	227
Tennessee	614,649	309	1,989	44,461	41	0.09	120	104	86.7	370
Utah	128,042	44	2,910	11,919	4	0.03	21	11	52.4	568
West Virginia	440,117	174	2,529	28,837	16	0.06	124	45	36.3	233
Wisconsin	865,846	158	1,580	68,107	127	0.19	196	149	76.0	347
Wyoming	49,590	8	6,199	6,580	4	0.06	6	2	33.3	1,097
Totals	16,443,658	6,194		1,238,872	1,063		3,323	2,003		
Means			2,654			0.09			60.3	373

Notes: (1) Includes only workers who are covered by Old-Age and Survivor's Insurance.
(2) Small establishment—0-499 workers. Large establishment—500 or more workers.
Sources: (A) U.S. Bureau of the Census and U.S. Bureau of Old-Age and Survivor's Insurance, cooperative report, *County Business Patterns*, First Quarter 1951, Part I, U.S. Summary, U.S. Government Printing Office, Washington, D.C., 1953.
(B) Tabulated from questionnaires returned by consultants.

lishments have in-plant nursing coverage. Hawaii had the highest proportion of small plant coverage, 3%. The mean for all 22 areas was 0.7%. With respect to establishments employing 500 or more workers, 18 of the 22 areas had more than 50% of such manufacturing establishments with in-plant nursing services.

Comparison of manufacturing establishments with all other establishments showed a number of differences. Taking the 22 areas as a whole, nearly 79% of the workers under Old Age and Survivor's Insurance in 1951 were employed in small (0-499) establishments. However, more than 92% of the workers in other-than-manufacturing establish-

TABLE II.
MANUFACTURING INDUSTRY
NUMBER OF WORKERS[1] AND OCCUPATIONAL HEALTH NURSES EMPLOYED IN 22 AREAS AND THE PERCENT OF SMALL AND LARGE[2] ESTABLISHMENTS IN MANUFACTURING THAT EMPLOY NURSES

				Small Establishments			Large Establishments			
					With Nurses			With Nurses		
Areas	Workers[A]	OH[B] Nurses	Workers Per Nurse	Total[A] Estab.	No.[B]	%	Total[A] Estab.	No.[B]	%	Number of Small Plants for Every Large Plant
Colorado	59,687	33	1,809	1,842	6	0.3	15	7	46.7	123
Connecticut	415,282	487	853	4,391	105	2.5	165	160	96.9	27
Delaware	54,656	55	994	533	11	2.1	22	14	63.6	24
Florida	115,150	50	2,303	4,497	5	0.1	29	17	58.6	155
Georgia	297,097	140	2,122	5,981	35	0.6	109	57	52.3	55
Hawaii	25,238	27	935	498	15	3.0	9	7	77.8	55
Indiana	623,041	565	1,103	5,790	57	1.0	225	158	70.2	26
Iowa	160,862	127	1,267	3,177	10	0.3	57	39	68.4	56
Maine	114,426	62	1,846	3,074	15	0.5	40	24	60.0	77
Minnesota	197,223	149	1,323	5,112	11	0.2	54	54	100.0	94
Missouri	364,180	292	1,247	6,238	61	1.0	112	99	88.4	56
Nevada	3,484	1	3,484	147	1	0.7	0	—	—	—
New Hampshire	84,332	57	1,480	1,555	23	1.4	30	19	63.3	52
New Mexico	14,101	0		560	0	0.0	3	0	0.0	187
New York	1,989,276	1,011	1,968	50,809	176	0.3	476	328	68.9	107
Pennsylvania	1,554,132	1,055	1,473	17,733	173	1.0	510	309	60.6	35
Rhode Island	158,732	89	1,784	2,410	38	1.6	59	36	61.0	41
Tennessee	259,310	245	1,058	4,180	30	0.7	82	81	98.8	51
Utah	28,421	14	2,030	815	5	0.4	8	3	37.5	102
West Virginia	135,638	160	848	2,192	12	0.5	57	42	73.7	38
Wisconsin	456,837	501	912	7,206	102	1.4	169	145	85.8	43
Wyoming	5,428	0	1,323	292	0	0.0	1	0	0.0	292
Totals	7,116,446	5,120		129,032	889		2,232	1,599		
Means			1,389			0.7			71.6	58

Notes: (1) Includes only workers who are covered by Old-Age and Survivor's Insurance.
(2) Small establishment—0-499 workers. Large establishment—500 or more workers.
Sources: (A) U.S. Bureau of the Census and U.S. Bureau of Old-Age and Survivor's Insurance, cooperative report, *County Business Patterns*, First Quarter 1951, Part I, U.S. Summary, U.S. Government Printing Office, Washington, D.C., 1953.
(B) Tabulated from questionnaires returned by consultants.

TABLE III.
DISTRIBUTION OF WORKERS, ESTABLISHMENTS, AND NURSES IN MANUFACTURING AND OTHER INDUSTRY ACCORDING TO SIZE OF ESTABLISHMENTS

	Workers		Establishments		
Size of Establishments	Number[1]	Percent of Total	Number[A]	With R.N.'s[B]	Percent With R.N.'s
All Industry					
0-99 Workers	8,708,000	53.0	1,216,693	—	—
100-499 "	4,248,000	25.8	22,179	1,063	4.8
0-499 "	12,956,000	78.8	1,238,872	1,063	0.09
500 + "	3,487,000	21.2	3,323	2,003	60.3
Total	16,443,658[A]	100.0	1,242,195	3,066	0.2
Manufacturing					
0-99 Workers	2,022,000	28.4	118,887	—	—
100-499 "	2,291,000	32.2	10,145	889	8.8
0-499 "	4,313,000	60.6	129,032	889	0.7
500 + "	2,803,000	39.4	2,232	1,599	71.6
Total	7,116,446[A]	100.00	131,261	2,488	1.89
Other-than-Manufacturing					
0-99 Workers	6,686,000	71.6	1,097,806	—	—
100-499 "	1,957,000	21.1	12,034	174	1.4
0-499 "	8,643,000	92.7	1,109,840	174	0.02
500 + "	684,000	7.3	1,091	404	37.0
Total	9,327,212[A]	100.0	1,110,931	578	0.05

Note: (1) Approximate number of workers who are covered by Old-Age and Survivor's Insurance in 22 areas.
Sources: (A) U.S. Bureau of the Census and U.S. Bureau of Old-Age and Survivor's Insurance, cooperative report, *County Business Patterns*, First Quarter 1951, Part I, U.S. Summary, U.S. Government Printing Office, Washington, D.C., 1953.
(B) Tabulated from questionnaires returned by consultants.

ments were employed in small plants as compared with 60% in manufacturing. Furthermore, the very small establishments of 0 to 99 workers employed more than 70% of all workers in other-than-manufacturing, whereas the comparable ratio for manufacturing establishments was only 28% (Table III). Seventy-two percent of large manufacturing establishments had nurses in the plant, in contrast with 37% of the other large establishments.

Similarly, small manufacturing plants had proportionately more nursing service than did other small establishments. In the 100 to 499 size, 8.8% of manfacturing had a nurse on duty in contrast to 1.4% of other establishments of comparable size. Table III shows that of the labor force covered by OASI, a little less than half were in manufacturing industry, however, more than four-fifths of the establishments with nurses were in this group. Because there were proportionately more large plants in the manufacturing group, the relative frequency of plants with nurses was 36 times as great in manufacturing as in other types of establishments.

Comment

THE purpose of occupational health programs is to promote and maintain the health and effectiveness of individuals at and through their places of employment. The nurse is recognized as a key member of the usual occupational health team of physician, nurse, engineer and chemist. The "standard" in-plant health program includes a nurse. It is assumed, for the purposes of this discussion, that establishments employing nurses in the plant enjoyed some of the benefits of the "standard" in-plant health program. Therefore, it is possible to speculate as to the extent of in-plant occupational health programs in the 22 areas studied, from the data on distribution of nurses. It is recognized that every employer must meet the requirements of the appropriate workmen's compensation act and other pertinent regulations and supply medical care for employees injured on the job, however, it is suggested that the extent of adequate occupational health services can be roughly measured by the distribution of nursing services.

Accepting nursing services in the plant as the best available yardstick of occupational health services, it may be concluded that in the 22 areas under study there are still substantial gaps in services even in the most favorable industry, namely, manufacturing. More than 25% of large manufacturing establishments have no nurse on duty in the plant, while 99% of small manufacturing plants lack this important feature of an in-plant health service. In other establishments the picture is even darker; nearly two-thirds of the large and 99.98% of the small establishments have no nurse on duty.

These figures will help us view occupational health more realistically. On one side of the picture, the health needs of workers in establishments with 500 or more workers can be met by in-plant programs with nurses on duty. Vigorous promotion by all concerned can hasten the day when every state will match Minnesota's record of 100% coverage in all establishments with 500 or more workers.

On the other side of the picture, 100% in-plant nursing coverage in establishments employing 0-499 workers is an idle dream at present. By using part-time nurses, all establishments with 100-499 workers might be covered but the vast majority of the 0-99 workers establishments, in which 53% of the labor force under OASI was employed, cannot bring a nurse to the plant.

The small plant is the big problem, in that the ratio of small plants per large plant is 373 to 1. Providing occupational health programs for workers who are employed by 99% of the establishments with 0-499 workers, and for those in approximately 40% of the establishments that employ 500 or more workers, is not going to be easy. A serious effort must be made to solve the small plant health problem. It should be recognized that the sound patterns of occupational health now in operation cannot be used in every situation. Others beside industrial management have a contribution to make. For example, union health centers may be the most feasible approach to adequate occupational health for workers in the garment industry, restaurants, construction work and other occupations where only a handful of workers is assembled at a particular job and then only for a few weeks or months at a time. In small communities, the hospital or health department or an independent clinic may be the logical focus for a community occupational health service.

Those in the occupational health field should recognize their responsibility to every worker and try to enlist support from every appropriate source. Only then will joint planning for new types of programs and wider utilization of services already available be possible. These can result in new patterns of occupational health that will more nearly meet the needs of all workers.

Summary

A SURVEY of occupational health nurse coverage in establishments whose workers were covered by OASI showed for 22 areas of the country, that over half of establishments employing 500 or more workers had a nurse on duty in the plant. In contrast less than one in a thousand establishments of the 0 to 499 size had a nurse on duty. Manufacturing industries were better supplied with nurses than were other establishments.

This survey suggests that adequate occupational health services were available to less than one-quarter of the labor force in 1951. There was evidence that management-sponsored occupational health services could be provided through presently accepted patterns to the 47% of workers in establishments employing 100 or more workers. The absence of reported coverage for the remainder indicates that new approaches are needed. This will require more effective cooperation between management, labor, official and voluntary agencies, and the health professions.

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Occupational Health Services in Sweden

The Society of Swedish Company Doctors, formed in 1945 as a section within the Swedish Medical Association, has helped to formulate the program defining the responsibilities of doctors engaged in preventive health activities at places of work. According to terms of employment now in force, a company doctor is obligated: (1) to look after the health of employees; (2) to plan and superintend the organization of health and medical services within the enterprise; (3) to examine new employees and assist in assigning them to tasks which are more suitable from a health point of view; (4) to perform regular examinations of specified groups, e.g., persons under 21 and over 45 years of age, employees subjected to special occupational risks, etc; (5) to assist in measures against tuberculosis; (6) to inspect hygienic conditions within the enterprise, especially to see that dangers of contracting occupational disease are minimized by taking the necessary preventive measures in consultation with the safety engineer; (7) to check health trends within the enterprise by recording accidents, illnesses, absences, etc., and submitting an annual report thereon; (8) to participate in the work of the safety committee and give advice and instruction where needed to committee members or to safety deputies on the job; (9) to assist in information and poster compaigns to make employees health and safety conscious; (10) to supervise the duties of nurses, orderlies and voluntary health workers under his jurisdiction; (11) the company doctor should supervise the transfer to other tasks of employees who have become partially disabled as the result of accident or illness; and (12) he shall discharge his duties in full accord with scientific procedures and proved experience; he shall seek to preserve the health of employees and, in the case of accident or disease, restore health as quickly and effectively as possible, with due regard for considerations of social therapy as well as the nature and justified interests of the enterprise; and he shall work on the best possible terms with other doctors in helping the patient towards recovery. To perform these duties, which are far in excess of those stipulated by the Industrial Safety Act, the doctor shall make his services available to the company a certain number of hours each week, related to the total number of employees. The accepted ratio is one hour per week for every 100 employees. In general, company managements also like to have the doctor available to give employees medical treatment. According to our new rules, a company doctor can give such treatment either on company premises or in his own offices. However, this is to be construed as an extension of his private practice, for which he is to receive non-fixed fees upon the conclusion of treatment. If an employer secures private reception offices for a doctor, as well as attendant medical personnel and equipment, the doctor shall contribute his share of the acquisition and up-keep costs.

—From "Occupational Health Services in Sweden," by Dr. Erik Husmark, in *World Medical Journal*, January, 1955.

Industrial Mental Health

OBSERVATIONS AND PERSPECTIVES THE MENNINGER FOUNDATION SURVEY

WILLIAM C. MENNINGER, M.D., and HARRY LEVINSON, Ph.D.

OF THE five major areas in which a person confronts life's daily problems and learns to relate to other people—home, school, church, job, and social activity—the occupational area has received the least attention from psychiatry and its allied disciplines. On January 1, 1954, therefore, The Menninger Foundation undertook a survey of industrial mental health.

Despite the pioneering research of Dr. C. C. Burlingame at the Cheney Silk Mills in Connecticut in 1916, of Drs. Salmon and Campbell in the World War I military services, and of Dr. E. E. Southard for the Engineering Foundation in 1920, there have been few subsequent industrial research projects by psychiatrists or clinical psychologists. The single text ever published on industrial psychiatry was written by Dr. V. V. Anderson, summarizing four years' work at Macy's Department Store, in 1929.

Although the Metropolitan Life Insurance Company has had a psychiatrist in the Medical Department since 1922, there are today less than half a dozen full-time psychiatrists and equally few clinical psychologists and social workers in industry.

This is not to say that emotional problems are of little import to industry. Dr. Burlingame concluded nearly 40 years ago that "psychoneuroses and pathological emotional attitudes of employees toward their employment, their foremen and their fellow workers and machines were responsible for a greater loss in dollars and cents than accidents and contagion." Dr. Southard found that 62% of more than 4,000 persons discharged from their jobs were fired for reasons of personality maladjustment rather than occupational incompetence.

A few years afterward, the surgeon of a leading railroad complained that "industrial psychopathy has for some time been recognized as a prominent factor in labor problems and it is no less a factor in accidents."

A decade later, a British industrial physician concluded that 25% of the working population he studied suffered from psychological symptoms "sufficient to interfere with happiness or efficiency." And about the same time, Dr. R. N. McMurry, a leading industrial psychologist, noted that "such factors as ill-advised company policy, particularly 'smallness' in minor matters, too great emphasis on efficiency, and personality peculiarities among the members of the administrative staff eventually give rise to labor trouble."

Contemporary with the psychiatric pioneers were the early industrial psychologists who evolved a two-pronged approach to the industrial field. On the one hand they pioneered the development of a wide variety of selection and placement tests to ascertain by statistical means a person's intelligence, skills and interests. On the other, they fostered extensive research into human engineering, the adaptation of machines and working environment to the physical limitations and comfort requirements of the worker. These are still the main approaches of industrial psychologists today, although they have been supplemented in recent years by the work of social psychologists who are giving attention to workers' morale and attitudes by means of large-scale surveys. But none of these methods has provided an avenue of approach to the personal problems of the worker—those that he brings from home to the job and from the job home.

World War II provided three major avenues for a demonstration of the contribution of psychiatry and its allied professions to the functioning of large masses of men under extremely difficult conditions: the screening and elimination of the emotionally unstable and potentially unstable; the establishment of guidance centers ("emotional first-aid" stations) which headed off more serious illness and saved many men for the emergency tasks which lay ahead of them; rapid treatment immediately behind the lines for those who broke down in combat.

The war also provided opportunities for psychiatrists like Dr. L. E. Himler at General Motors, Dr. Matthew Brody at Sperry Gyroscope, and Dr. Evelyn Ivey at the Picatinny Arsenal to demonstrate further that psychiatry could contribute to industrial production.

These reports and experiences were only "straws in the wind," however—merely surface clues to a problem whose magnitude had never definitely been measured. The first goals of The Menninger Foundation's survey, therefore, were to ascertain more exactly the size and nature of the problem and to learn what was being done in industry and elsewhere to solve or alleviate it.

Such a survey called not only for an intensive

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study of the meager scientific literature available, but also for site visits to industries, universities, research centers, industrial consultants, management conferences, labor meetings, and psychiatric and psychological meetings.

THE most conspicuous mental health problems in industry are what might be called the "three A's": Absenteeism, Accidents, and Alcoholism. No business or industry is free of them. Like light ships warning of unseen dangers, these fairly obvious problems betoken many less discernible ones beneath.

Absenteeism—only 5% of it is due to on-the-job causes—is estimated to cost industry $9 billion each year. Dr. Norman Plummer, of the New York Telephone Company, recently reported that sickness absenteeism cost his company $10 million annually. Dr. Plummer and his associates studied the absence pattern of many employees throughout their total periods of employment. These are among their findings:

"Three-fourths of all the absences in any given year are found among one-third of the workers.

"The group of employees with the highest absences in their first year of service had the highest average yearly absence throughout their entire periods of service.

"There are 'sickness-prone' and also 'absence-prone' employees.

"A direct comparison between low-absence and high-absence women employees reveals slight differences in susceptibility to organic diseases, such as cancer, heart disease and infections, but *marked differences in susceptibility to the functional diseases or the disorders of feeling, state, thought and behavior.*"

Dr. Plummer notes that "a great hazard in reaching a medical opinion is to consider each cold, headache, fatigue state or gastrointestinal upset, separately and independently, and not to appreciate that it is part of a chronic and repetitive disease having to do with the reactions of the particular individual to situations and stresses of life."

Another interesting piece of evidence from this same study: Dr. Plummer and his associates asked supervisors to rate the social adjustment of a group of employees who had worked for the company 20 years or more. When these ratings were made and correlated with the sickness-absence records of the first two years of employment, it was found that those who were absent the most in the first two years were the most poorly adjusted socially 20 years later.

Of even greater magnitude than absentee loss is the additional unmeasured loss due to mild illnesses which do not keep men from their work, but do interfere with their efficiency. The Metropolitan's Dr. Lydia Giberson, who in 1939 organized the first symposium on industrial psychiatry for the American Psychiatric Association, has observed, "Just when the psychoneurotic or maladjusted employee is not obviously ill enough to the untrained eye to be away from work is the very time when he is really costly to the organization. Their lowered efficiency and emotional distortion affect sympathetically all those around them, and the morale and working efficiency of a group may be seriously lowered by just one of them."

Although the industrial accident mortality has been cut in two during the past 25 years by strenuous safety efforts, about 15,000 workers died in industrial accidents last year and two million suffered disabling injuries at a total cost of more than $3 billion.

Harry Crook, of the Westinghouse Company, reported that if his company could have reduced its 1953 accidents by one-half, the resulting cor tribution to profits would have been equivalent to increasing the sales volume $6 million.

Dr. Morris S. Schulzinger, a specialist in the treatment of accidental injuries, notes that between 80% and 90% of accidents are attributab'e to "human factors" or psychological causes. From his study of 38,000 accident cases, he reported that "accidents appear to be a widespread endemic affliction, and part of a disease syndrome—the accident syndrome. Most accidents were observed to conform to a pattern . . . . and are thus frequently predictable."

Interestingly enough, Dr. Schulzinger adds that "one accident seems to act as a sensitizing factor or as a trigger mechanism for another accident in the patient, family, or co-worker. Furthermore, in 50% of those having repeated accidents (three or more), they occur during identical hours. This tendency increases with the number of accidents per patient. Some persons tend to repeat accidents on certain days of the week, or month, particularly on days with special significance to the individual. There are also those who have a predilection for certain types of accidents or for injury to certain parts of the body."

Alcoholism has been termed a "Billion Dollar Hangover" for industry. An estimated one out of every 50 workers is a problem drinker and 89% of them are in the 35-55 age range, by which time industry has a heavy investment in them. To lose men of such experience, and often of considerable responsibility, is costly enough, but more costly is the loss that occurs before the alcoholic is recognized and referred for treatment. Judgmental errors, increasing inefficiency and difficulties with co-workers are seldom translatable into statistics. A. A. Low, industrial relations director of Consolidated Edison Company of New York, says that "the majority of problem drinkers in business and industry are in the early and middle stages of their disorder. Aside from their overindulgence in alcohol they represent, as a rule, a stable group who in our own company have a period of service which averages over 20 years. We feel they are worth salvaging." Consolidated Edison backs up its feeling with its money: it and Standard Oil of New Jersey underwrite a large share of the cost of the Consultation Clinic for Alcoholism at University Hospital in New York.

Prior to establishing help for alcoholics, Mr. Low said, it was "no secret that the operating and

clerical departments often carried the employee with a drinking problem for many years and used many forms of subterfuge to cover up his deficiencies. Unfortunately he would slowly get worse, use up all his 'last chances' so to speak, and finally when he came to the point of decision he would either be fired or covered by a medical diagnosis in order to be placed on the disability roster. Such a policy constituted a long term loss to the company when early recognition might have established the possibility of rehabilitation or made possible the determination of an economic loss before a late critical stage."

The "three A's" highlight only a few of the more easily measureable "specifics" among industrial mental health problems. Still ungauged are the real costs of employee turnover due to emotional reactions to the job; low morale due to supervisors insensitive to human feelings; errors, rejects and seconds due to social and industrial pressures which exceed human limits, and many other similar problems.

QUITE apart from the emotional problems which the worker brings to the job, there are a number of problems inherent in the job itself.

In modern industrial work, the breakdown of many production tasks into small repetitive units which require little skill, and the inability of the worker to see the end product of his work, or identify with it, tend to produce a sense of frustration and degradation. The worker senses, in many cases, that he is being tolerated only until a machine is invented to replace him. To add to his sense of insecurity, management often becomes "they," off in some distant financial center —too big, too busy, too far away to care about the man in the oil-stained shirt who stamps holes in one of thousands of pieces of metal produced daily in a dozen scattered plants.

Although the worker finds increasing security and an ever-louder voice in his political and economic destiny, he sees his role as an industrial contributor threatened with rapid deflation, with consequent loss of self-esteem and social status.

The man on whom the worker relies for leadership and security is his first-line supervisor or foreman—a man with plenty of problems of his own in relation to his changing role in the plant.

As the unions have grown, the supervisor has lost more and more of his power and status to the union steward and business agent. The grievance procedure often goes around him or above him to persons in higher authority. Often, the supervisor sees himself only as a buffer, battered by the workers on one side and management on the other. In some cases, foremen and supervisors have sought to unionize themselves, not for economic gain, but to protect their status and to have some support for their position.

And now, in addition to technical leadership, problems of morale and psychological motivation are thrust upon him. Sometimes bitterly, he sees himself as a combination nursemaid, father confessor, and amateur psychologist. For little of this is he prepared by training or experience. Yet he cannot fall back on old-fashioned aggressive and punitive techniques of supervision. Progressive management recognizes that profitable production has to be wooed, not wrung, from workers.

Management has agreed that the key role of the supervisor therefore requires that he is trained. Supervisory training programs have sprung up all over the country, some sound and solid, others just a superficial lick and a promise. The properly trained supervisor, it is hoped, will give his men adequate leadership, personal recognition, counsel, direction, and paternal benevolence. This, in turn, it is expected, will cut down on absenteeism, intra-plant feuds and frictions and the stresses and strains of the job.

Will it? Dr. Norman R. F. Maier points out "That the first level of supervision is an all important determiner of employee morale and loyalty is recognized, but that a similar problem is present at higher levels is not so well appreciated by top executives."

Thus it was not surprising that at least some of the foremen were doing a poorer job after supervisory training than before, as they learned what they should be doing but found that their own bosses didn't even know that much. One important study showed that "the kind of supervisor under whom the foremen operates seemed more related to (their) attitude and behavior . . . . than the fact that they had or had not received the leadership training course."

In other words, the mental health climate of a plant was dependent upon the understanding and leadership of the top management. Psychological climate, like other climate, starts from the top.

WHAT about this all-powerful, all-responsible Goliath who must now shoulder the psychology of his workmen and his foreman as well as the technology of his machines?

Unfortunately for him, perhaps, he is just as human as the rest of us, and with a few more problems than most.

Lyle Spencer, President of Science Research Associates and a Governor of the Menninger Foundation, reports a survey of young industrial presidents, taken by their own organization. The survey discloses that the average young executive:

"Spends more than 50 hours a week at his desk, spends 80% of his entire office time just talking to people.

"Is plagued by a feeling of having more work to do than he can accomplish.

"Has strong feelings of personal responsibility about his business and therefore has a tendency to do things himself so they will be done right.

"Is hypercritical of himself.

"Needs help most in finding better ways of reducing personal worries and anxieties."

Other studies indicate that many executives take short, and inadequate vacations, that they usually take too much of their work home with them at night, that at lunch they do more shoptalking than eating. In short, the executive often

achieves his success and his company's prosperity at a considerable personal cost. At least one management consultant finds it great sport to draw up organization charts of the companies he knows, indicating the psychosomatic symptoms of each of the executives.

An anonymous wag described the position of the executive in these graphic terms:

"As nearly everyone knows, an executive has practically nothing to do, except to decide what is to be done; to tell somebody to do it; to listen to reasons why it should not be done, why it should be done by someone else, or why it should be done in a different way; to follow up to see if the thing has been done; to discover that it has been done incorrectly; to point out how it should have been done; to conclude that as long as it has been done, it may as well be left where it is; to wonder if it is not time to get rid of a person who cannot do a thing right; to reflect that he probably has a wife and a large family, and that certainly any successor would be just as bad, and maybe worse; to consider how much simpler and better the thing would have been done if one had done it oneself in the first place; to reflect sadly that one could have done it in 20 minutes, and, as things turned out, one has to spend two days to find out why it has taken three weeks for someone else to do it wrong."

This is the harried, hurried, haggard key to mental health in the industrial situation.

THE mental health problems of industry are, of course, of vital concern to labor. Forward-looking labor leaders have always seen the labor movement as an instrument for enhancing the individual dignity of the man who worked with his hands, and not just as an economic device. Furthermore, when a man's dignity is offended and when his human qualities fail to be recognized, then his resentment manifests itself in multiple, and sometimes irrational, complaints and grievances. In wild-cat strikes, slowdowns and other forms of hostility the workers may hit at union leadership and management alike.

Many management innovations are regarded by labor as exploitative tools. Industrial Medical Departments are still suffering from the onus of being regarded as plant spy systems. Recognizing that labor would be concerned lest supervisory training and mental health efforts in industry would become "management psychology," a synonym for exploitation, labor leaders and labor meetings in several different communities were visited. We found that the line worker was quick to recognize the artificiality of some of the supervisory training in a context where higher management was unchanged. The derisive label "charm courses" frequently recurred in conversations about supervisory training. Resented, too, was the often too quick firing of men with personal problems, despite long services, by foremen who would be quick to repair a machine but who had no time to help repair a man.

At the same time, we learned, labor is very much concerned about mental health in general. Week-long participation in the annual meeting of the CIO Community Services Committee disclosed intense interest in mental health and an acute desire on the part of these labor representatives for both information and training on how to communicate information to their members. Most health clinics operated by various unions in the AFL employ psychiatrists and psychologists; others are now seeking to provide psychiatric services. The CIO's UAW operates a mental hygiene clinic of its own in Detroit.

From labor's point of view, mental hygiene efforts among the workers—whether by union or management—and the development of a better emotional climate in the plant can only enhance the worker's health and dignity. But these efforts, labor feels, must be more than lip service to another industrial relations fad. They must stem from the top and permeate an entire organization.

THE TASK of industry is to produce goods for a profit in order to provide wages for workers and returns for investors. Such profitable production today requires the partnership of capital, management and labor. It is our conviction that, in such an arrangement, the worker contributes best if he has a feeling of responsibility for his part of the task; if he has a desire to do his part; if he has the capacity to work with others on a team; if he is regularly present at his task; if, insofar as possible, causes for accidents and errors are eliminated; and if psychological conflicts are minimized.

That such conditions hold for the worker requires that he find in his work:

A sense of shaping his own life activities.

A sense of participation with dignity in both the task and the decisions relating to it which affect him.

A sense of status, of worthwhileness, of recognition.

A sense of creative contribution—of giving something of himself for the betterment of his fellows.

For the foreman, or supervisor, in addition, there must be recognition and support of his leadership role plus commensurate authority, respect and opportunity for identification with management.

If profitable production is the responsibility of management, and such psychological feelings and problems as described above play an important role in production, then, logically, industrial executives must learn to create positive psychological conditions and eliminate or minimize negative conditions.

Obviously, for an executive to be able to create a mentally healthy climate within a given organization, he needs help in at least two specific forms. First, he needs to develop an understanding of human motivation and psychology. Second, he needs psychological assistance in four ways:

Counseling and guidance to minimize his own personal conflicts.

Advice and direction on dealing with the specific psychological burdens of his job.

Consultation on special human relations problems.

Regular psychiatric examination as part of his regular "health maintenance" physical examination. An executive who is far-sighted enough and wise enough to apply mental health measures to himself, will also be wise enough to institute the same kinds of measures for those who make up his working team.

A RESOLUTE attack on mental health problems in industry must necessarily be a long-term, comprehensive process.

In the front lines, combating everyday problems, cleaning out the twin infections of discontent and disruption, there must be adequate numbers of mental health first aid men: psychiatrists, psychologists, social workers. There aren't nearly enough today for other needs, let alone industry's. Engineering scholarships? Yes. Psychiatric scholarships? No!

There must be facilities for the specialized training of those who will make their contributions on the industrial front. In the whole United States there is only one training program which tries to prepare psychiatrists for industry, and its maximum capacity is two psychiatrists at a time. There are no specialized programs preparing clinical psychologists and social workers for service in industry. Industry supports none.

For the combatants in the front lines, there must be solid support in the rear echelons. On the mental health front this means continuous research and a steady flow of new knowledge, for the attack is no better than the weapons it uses and the techniques it applies.

How little we know of what work means to a man! In what ways can work give rich meaning, and, conversely, how can it deprive life of meaning? What does a man want of his work, and how does he go about trying to get it? How does work relate to status, prestige, self-esteem, and how can it be made to enhance these? What are the health-giving contributions of the work group, and how can these be fostered? Why does a man strike, often at great cost to himself, when the goals to be attained seem so trifling to the outsider? What can the understanding of human motivation contribute to the alleviation of labor disputes? To what extent are there still industrial management-labor quarrels about issues long outdated, and why? These and hundreds of other human industrial problems await the mental health researcher.

And they will wait for some time. Of two billion dollars being expended by the Federal government for research during the current fiscal year, 87% is going into the physical sciences. Of 94 million dollars appropriated for medical research less than 5% is for the study of mental health, the nation's No. 1 health problem. We spend $61.74 a year per person on alcoholic beverages, while investing less than five cents a person on mental health research, only a small part of which is devoted to the problem of alcoholism. Ironically, despite its research-mindedness and despite its growing concern about human problems, industry's contribution to mental health research is practically nothing.

A major part of any attack on a social problem is widespread public interest and support. An effort to alleviate mental health stresses in industry requires a complementary effort in the home. Education about mental health can do as much to bring a man to the job contented as education about diet does to bring him to his job well-nourished. Industry can foster such education. It is not doing so now.

Despite the existence of an accepted body of mental health knowledge, much of what industry seeks to teach its supervisors is glib and superficial. Few manuals, if any, which are used in human relations courses in industry systematically explain human motivation as psychiatry and its allied disciplines have come to know it. Industry, which makes use of the latest theories and methods in customer-motivation research, has yet to apply the same knowledge to the people who are closest to it.

Through publication and distribution of mental health information in many kinds of media, through the preparation of specific information and education projects to deal with special problems, through seminars of executives and mental health specialists, through the establishment of fellowships for mental health educators, industry can help create a mental health climate—if it will.

This willingness of industry to participate in programs to foster industrial mental health is one of the paramount questions which face The Menninger Foundation after nine months of this preliminary survey. The needs are there. The opportunities are there. Does industry wish to play its part? The answer to this question will in great measure determine how fast and how far The Menninger Foundation can move from these small beginnings to a major program of industrial psychiatry.

New Type Damage

MEANWHILE, Dr. Beardwood cautioned industry to be on the lookout for a new type of damage suit growing out of the theory that everybody has a gadget in the brain, termed an appestat, which regulates how much we eat. According to this theory, if the appestat is injured the appetite may run riot—and pile pounds on the victim.

—JOHN TROAN, in *Pittsburgh Press*, November 18, 1954, regarding address of JOSEPH T. BEARDWOOD, JR., at Industrial Hygiene Foundation meeting.

Industrial Medical Association

President's Page

THE preliminary program and the invitation to attend the 1955 Industrial Health Conference have already been mailed. On the opposite page the Industrial Medical Association program is given.

In accordance with established custom, representatives of the Industrial Health Team—the physician, the dentist, the nurse, and the industrial hygienist, all members of their own independent organizations—will convene in Buffalo, New York, from April 23 to 29, to discuss timely subjects having to do with the health and welfare of the employed portion of our population.

At the 1954 Industrial Health Conference in Chicago, 1,981 were in attendance, 34% of which represented the Industrial Medical Association; 27%, the American Association of Industrial Nurses; 23%, the American Industrial Hygiene Association; 5%, the American Conference of Governmental Industrial Hygienists, and 1%, the American Association of Industrial Dentists, plus 198 registered guests. Advance bookings for the 1955 Conference to be held in Buffalo indicate that the attendance will equal, if not surpass, that of the 1954 Conference.

The City of Buffalo prides itself on having a Memorial Auditorium admirably suited to our needs. Hotel accommodations are believed to be adequate. However, owing to the proximity of Buffalo to Niagara Falls—with early Spring regarded as open season for newly weds—it is strongly recommended that reservations be made as far in advance as possible.

The sessions actually begin on Sunday, April 24, when the American Conference of Government Industrial Hygienists has a round table discussion, in which chemists, engineers, nurses, and physicians participate. Here is evidence that teamwork and coordination again become the basic principles and purposes of the Conference.

Although each organization develops its own program to provide topics of maximum interest to its membership, the over-all Conference achieves considerable coordination of activity by means of careful advance planning. In this manner it is possible to have various joint sessions and other features involving mutual participation without duplication or conflict.

It will be noted that portions of the scientific sessions are devoted to subjects of interest as well as pressing importance to all segments of industry. Participation has not been restricted to members of the respective organizations, but included in the program are authorities in specific fields, and representatives of teaching faculties. All of which indicates, and is illustrative of, the growing realization that, to insure and maintain the health standards of the employed person, there must be a meeting of minds among all who are in any way involved in a program of constructive health maintenance.

The college professor is no longer immune; the chemist, the toxicologist, the engineer must work together to determine the facts. When determined, these facts must be related to managements in a language they can understand. The safety engineer, the nurse, and the physician then come into the picture. Strong accident prevention procedures and constructive health maintenance programs pay handsome dividends to all concerned in today's business affairs.

THE TECHNICAL and scientific exhibits should prove, this year, to be of unusual significance and importance. Ample space has been obtainable and sufficient time between discussions has been allocated in order to allow all participants and all in attendance to benefit from the efforts expended by those who have gone to much detail and expense in the preparation of the various educational and technical displays.

The business activities of IMA will begin on Monday morning, April 25, when the District Counselors will meet with the Directors of the Occupational Health Institute. All members of the organization interested in the affairs of the Institute are invited to attend this session. Similar meetings dealing with various administrative aspects of IMA will be held until the hour of the Annual Business Meeting, which will take place on Wednesday afternoon, April 27, at which time new Officers and Directors will be elected for the coming year. To all members I would say, please be sure that you are in attendance. It is extremely important that you know not only the personality but also the background of the candidate you elect to office. The future of the organization is totally dependent upon the ability and

vision of those you select. Management needs advice and guidance; labor is deserving of help in its efforts to maintain a healthy working force; physicians, together with all their paramedical associates, need inspiration and a spirit of enthusiasm to get the job done in the best interests of all concerned.

On behalf of the members of the Executive Committee, the Directors, and the members at large who have put their best foot forward in order to make the 1955 Conference the best ever, may I extend my personal invitation to you to attend and if possible bring a member of your management with you. We will guarantee that he will see and learn something of interest.

Industrial Medical Association

Buffalo Health Conference

THE 1955 Industrial Health Conference, to be held at Buffalo, New York, April 23-29, will, as usual, bring together, for a profitable week of meetings, the five participating Associations: Industrial Medical Association, American Conference of Governmental Industrial Hygienists, American Industrial Hygiene Association, American Association of Industrial Dentists, and American Association of Industrial Nurses, Inc. The Conference Headquarters will be at Memorial Auditorium. The preliminary program has been mailed to about 40,000 persons. For additional copies, write to E. C. HOLMBLAD, M.D., Managing Director, Industrial Medical Association, 28 East Jackson Boulevard, Chicago 4. The IMA has the following schedule:

Tuesday, April 26

CLINICAL Teaching Sessions at University of Buffalo Medical School.

"Dermatology" (at Meyer Memorial Hospital) under direction of EARL D. OSBORNE, M.D., Professor of Dermatology, University of Buffalo Medical School.

Surgical Section at Auditorium, University of Buffalo Medical School. Chairman: JOSEPH M. DZIOB, M.D., Bethlehem Clinic. Presiding: ROSWELL K. BROWN, M.D., Associate Professor of Surgery, University of Buffalo School of Medicine.

"The Fracture Blister"—WILLIAM R. BUCKLEY, M.D., Dermatologist, Eastman Kodak Company, Rochester; WALTER C. LOBITZ, JR., M.D., Assistant Professor of Dermatology, Dartmouth Medical School.

"Compensability of Inguinal Hernia in New York State"—L. A. HULBERT, M.D., Springville, New York, Former Medical Examiner, Workmen's Compensation Board, New York State.

"Immobilization for Transportation of the Injured"—CHARLES E. WILES, M.D., Instructor in Surgery, University of Buffalo School of Medicine.

"The Emergency Treatment of Extensive Burns"—JOHN BURKE, M.D., Assistant Professor of Surgery, University of Buffalo School of Medicine.

"The Treatment of Facial Lacerations"—LESLIE H. BACKUS, M.D., Associate in Surgery, University of Buffalo School of Medicine.

"The Treatment of Peripheral Nerve Injuries of the Upper Extremity"—CARL J. GRAF, M.D., Assistant Clinical Professor of Neurosurgery, University of Buffalo School of Medicine.

"Management of Traumatic Leg Ulcers"—EVERETT H. WESP, M.D., Associate in Surgery, University of Buffalo School of Medicine.

"Fractures of the Fingers and Hand"—ROSWELL K. BROWN, M.D.

Tuesday Afternoon

OPENING Session—Presiding: KIEFFER DAVIS, M.D., Medical Director, Phillips Petroleum Company, Bartlesville, Oklahoma.

Sappington Memorial Lecture.

Panel Discussion: "Criteria of Industrial Pulmonary Disease and the Evaluation of Resulting Disability"—ARTHUR J. VORWALD, M.D., Professor and Chairman, Department of Industrial Medicine and Hygiene, Wayne University, Detroit.

"Pentaborane Intoxication"—A. G. KAMMER, M.D., Head of Department of Occupational Health, University of Pittsburgh.

"Living Situations in Human Relations"—Chairman: JEAN S. FELTON, M.D., School of Medicine and University Hospitals, University of Oklahoma, Oklahoma City; GRAHAM TAYLOR, M.D., Graduate School of Public Health, University of Pittsburgh; CHRIS ARGYRIS, M.D., New York School of Industrial and Labor Relations, Cornell University, Ithaca, New York.

Wednesday, April 27

CRITERIA for Diagnosis of Occupational Diseases"—Chairman: L. W. SPOLYAR, M.D., Director, Division of Industrial Hygiene, Indiana State Board of Health, Indianapolis, Indiana.

"Metals and Non-Organic Materials"—ROBERT A. KEHOE, M.D., The Kettering Laboratory, University of Cincinnati, Cincinnati, Ohio.

"Solvents"—JOHN H. FOULGER, M.D., Director of Medical Research, E. I. du Pont de Nemours & Company, Wilmington, Delaware.

"Organic Materials"—JOHN A. ZAPP, JR., Director, Haskell Laboratory for Toxicology and Industrial Medicine, E. I. du Pont de Nemours & Company, Wilmington, Delaware.

"Radiation"—ROY E. ALBERT, M.D., Assistant to Chief (Industrial Health), Medical Branch of Division of Biology and Medicine, A.E.C., Washington, D.C.

Summary—ROBERT A. KEHOE, M.D.

"Evaluation of Audiometric and Hearing Standards in Industry"—CHARLES I. BARRON, M.D., Medical Director, Lockheed Aircraft Corporation, Burbank, California; ANDREW A. LOVE, M.D., Otologist, Lockheed Aircraft Corporation, Burbank.

"The Nurse in Audiometry"—MISS ANNA BAKKER, R.N., Eastman Kodak Company, Rochester, New York.

Thursday, April 28

MEDICAL Section: "Criteria of Diagnosis of Occupational Dermatoses"—Chairman, JOSEPH V. KLAUDER, M.D., Chairman of Committee on Dermatology, Industrial Medical Association, Philadelphia.

Memorial Auditorium, Main Street, Buffalo. Presiding: JOSEPH M. DZIOB, M.D., Associate in Surgery, University of Buffalo School of Medicine, Plant Surgeon, Bethlehem Steel Company, Lackawanna, New York.

"Recent Advances in Amputation Prostheses"—JOSEPH TRAUB, Chief of Prosthetic Service, Chronic Disease Research Institute, University of Buffalo School of Medicine.

"The Use of Cortisone and Related Compounds in Industrial Practice"—M. P. CHARNOCK, M.D., Plant Surgeon, Bethlehem Steel Company, Bethlehem, Pennsylvania.

"Bicipital Tenosynovitis"—LEONARD J. FLANAGAN, M.D., Binghamton, New York.

"Meniscus Injuries of the Knee"—JOSEPH D. GODFREY, M.D., Associate in Orthopedic Surgery, University of Buffalo School of Medicine.

Symposium: "Cardiac in Industry"—Chairman: HARRY E. UNGERLEIDER, M.D., Director of Medical Research, Equitable Life Assurance Society of the United States, New York City.

Surgical Section: Memorial Auditorium. Chairman: JOSEPH M. DZIOB, M.D.

"Trauma Conference"—ROBERT P. DOBBIE, M.D., Clinical Professor of Surgery, University of Buffalo School of Medicine.

Letters

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TO THE EDITOR: I recently had the distinction of being the first visitor to the Occupational Health Institute in New York. As one of the Consultants of the Institute, I wanted to see the recently acquired offices. Dr. Page spent about an hour with me, going over present and future plans. I was impressed with the enthusiasm, and the progress that is being made. The office receives a lot of correspondence from all over the country, and the list of approved industrial medical services is growing. Many new requests for surveys for industries are coming in. I would suggest that others stop in and pay a visit, to gain a better understanding of the scope and problems of the OHI.

—JOSEPH T. NOE, M.D.

Beryllium Toxicity

TO THE EDITOR: My staff and I have read with interest Dr. Johnstone's letter in the December issue of *Industrial Medicine and Surgery*, and may wish to comment at a later date. The company in whose plant we made the study is, and always has been, desirous of cooperating in every way toward establishing the facts of beryllium toxicity. They not only welcomed our study but, I am advised by them, will also welcome a study in their plant by any qualified investigator on the subject.

—JOSEPH SHILEN, M.D., Director,
Bureau of Industrial Hygiene.

Books

Circulation Studies

PERIPHERAL CIRCULATION IN MAN: G. E. WOLSTENHOLME, JESSIE S. FREEMAN and JOAN ETHERINGTON, Editors, Little, Brown and Company, Boston, 1954, pp. 210, $6.00.

This publication consists of 18 papers and subsequent discussion comprising a symposium on the peripheral circulation. The volume might well have been titled "Instrumentation in the Study of the Peripheral Circulation" since the methodology was the major subject of analysis. The studies pertaining to adaptation of the peripheral circulation to cold may have application in the evaluation of workers subject to this form of occupational stress. Of interest is the fact that the publication of this volume represents a continued attempt on the part of a major pharmaceutical firm to foster medical progress without the stigmatization of commercialism.

—MALCOLM C. MCCORD, M.D.

Nautilus but Nice

INTOXICATIONS ET MALADIES PROFESSIONNELLES: LEON DEROBERT. Editions Medicales Flammarion, Paris, France, 1954, pp. 1556 (loose-leaf), 8,800 francs. (In French.)

That shellfish, the nautilus, as it goes about its physiologic economy, has a way of adding on, period by period, a new house to the old. It discards nothing and in its last days it still has its tiny first abode. The lobster, another crustacean, has another way of meeting its demands for growing space. As the need arises, it casts off its outgrown shell and after a short period of perilous nudity acquires a new and larger house. So it is with substantial books on occupational health: some are nautiluses and some are lobsters. Some authors feel the urge to carry along all the past, reviewing and restating. Other authors are willing to break with most of the past, to present only the modern, the newness, the immediately useful. Both types of book are good. This present book distinctly is of the nautilus variety. It is an encyclopedic presentation of an almost endless array of the world's lore and chiefly on industrial toxicology. There is little that is new, and many items only relatively new did not find a place in the compilation. Since this monumental work must have required years in preparation, it is understandable that much of modern chemistry, with its attending toxicology, perforce must have been omitted, and so it was. The author has a clever eye for what is truly important and contrariwise for what deserves only a mention.

Since this book is in French, and since in the United States bilingual or polylingual ability is a rarity, the position must be taken that occupational health workers in other countries will prove to be the chief beneficiaries of this exhaustive assemblage. Wherever medical French is read, this work will be hailed, and this review urges upon such readers that here is a real contribution not to be overlooked.

Still Enigma

PROCEEDINGS OF THE SECOND NATIONAL CANCER CONFERENCE, 1952. The American Cancer Society, Inc., New York, 1954, pp. 1687, Two Volumes, $7.50.

These proceedings could be the source of a bit of grim and reluctant satisfaction to industrial physicians since it is indicated that chemical agents either made or used in industry have furnished the first precise clues as to the biochemical mechanism of cancer action and with particular reference to the organ site at which initiation probably takes place. Still it may be doubted that industrial physicians will take any especial pride in being identified with the source of any neoplastic disease.

These two volumes bring together all that is known about cancer as of the year 1952. That all is much, but still is lacking in the essence of understanding of the exact producers of cancer, why and when it shall appear. But every year is a year of attainment toward that time when the cancer riddle is removed from the ranks of the enigmatical. These proceedings for the year 1952 did not appear until late in 1954. In the meantime some of the authors have provided other publications not necessarily precisely in keeping with the pronouncements of 1952. An opportunity for embarrassment thus arises. One of the items of continued insistence on the part of cancer investigators is that promptness should attend investigation of every suspected cancer. This dictum is sound, but if these proceedings contain substantial newness for the guidance of physicians in cancer detection, the long delay in publication becomes a source of regret.

More Than Diversionary

INTRODUCTION TO PSYCHIATRIC OCCUPATIONAL THERAPY: GAIL S. FIDLER and JAY W. FIDLER. The Macmillan Company, New York, 1954, pp. 200, $4.00.

This book is built about the need for higher quality of occupational therapy for institutionalized psychiatric patients. The attitude is that currently psychiatric occupational therapy is applied on a haphazard basis without due regard for the needs of the individual patient, largely with the objective of giving the patient something to do. This little effective variety of therapy should be supplanted by a constructive form suggested in this language:

"When one considers the principles of psychiatric occupational therapy as discussed in current literature, it is apparent that a definite attempt is being made by those in the field to define it as something more than diversional therapy. There is growing awareness that controlled activity in the treatment of the psychiatric patient provides more than diverting the patient's thoughts from his illness, creating an interest, and preventing regression. This broadening of scope, along with more clearly defined aims and purposes, has done much to raise it to the level of a therapy. Specific aims, however, are of little value unless specific means can be provided for the achievement of these aims. While much has been said about purpose and function in the treatment of psychiatric patients, little information is available to the therapist to aid in the fulfillment of the purpose."

Diligently, the book portrays rational occupational therapy predicated upon the needs of the individual patient and carried out on a prescription of the psychiatrist well familiar with the mental state of the patient. This book is concerned principally with technical skills in living and techniques of dealing with feelings in order to make adjustment possible and satisfying. At no point do the authors contemplate the needs of near-psychiatric persons fully capable of employment in industry and who in fact are employed, but still are emotionally beset. This situation constitutes an outstanding medical requirement confronting the industrial physician. At the present time, therapy is mainly limited to counseling carried out by industrial nurses many of whom have acquired great skill in the process. This verbal mental rehabilitative service not always is sufficient. The concepts of this book in many instances may be adapted as an extension of the counseling services of industrial nurses on the behalf of industry to numerous illy-adjusted workers. Nothing in this book furnishes final details about this enterprise, but the principles are there; the objectives are stated; the overall procedures are revealed. What remains is for the industrial nurse or the industrial medical counselor to grasp the concept knowing full well that counseling as now conducted is not a sufficiency, and that an enlarged sphere of activity needs be provided. When this is accomplished, industrial guidance for near-psychiatric employees will have assumed a proportion better in keeping with the desirable.

The Art and the Science

PRINCIPLES OF INTERNAL MEDICINE: T. R. HARRISON. The Blakiston Company, Inc., New York, 1954, pp. 1703, $16.00.

The editors dedicated themselves to the task of producing a book with an appropriate balance between the art and the science of medicine. This they have accomplished admirably. As to the art, the first three chapters deal with, "The Approach to the Patient," "The Patient and His Environment," and "The Patient and the Physician." These are strange opening chapters for any standard book on internal medicine since some others leap precipitately into the scientific. Soon enough, the scientific is presented with amazing fecundity. Almost all of the roadways in internal medicine are explored. It is true that no great consideration is directed to the occupational diseases which is no reason for damnation since even the industrial physician first must be an internist concerned with all diseases in that domain just as every good internist, likewise, must be an industrial physician. The few sections pointed toward occupational health are most helpful, such as George W. Wright's "Pulmonary Disorders Due to Inhalation of Noxious Agents." In that section, he appraises, constructively, one of the disturbing new occupational diseases—Coal-Workers' Pneumoconiosis—in this language:

"Exposure to the inhalation of coal dust without substantial quantities of silica appears to be rare, at least in the United States. Because of this and the fact that pure coal dust or carbon inhalation by animals produced no reaction similar to silicosis, it has been accepted that the nodulation and conglomerate masses seen in coal miners are in reality a modified form of silicosis. Recently the Pneumoconiosis Research Unit of Cardiff, South Wales, has reported studies strongly suggesting that in the miners of that area pulmonary injury occurs from the inhalation of coal *per se* rather than from the inhalation of silica. Histologic studies show that the earliest change is the deposition of pigment in a stellate-shaped discrete macule about which is a zone of emphysema. There is a delicate network of reticular fibers in these pigmented areas but characteristically there is no hyaline deposition or extensive fibrosis such as typifies the silicotic nodule. These macules with their zone of focal emphysema are numerous and scattered throughout both lungs. This stage of the disease is categorized as simple pneumoconiosis of coal workers, and is recognized in the roentgenogram by tiny nodulations which may coalesce into larger nodules or mottlings. The disease remains at this stage if no further exposure occurs and is characterized by a lack of symptoms. Physiologic studies show little or no abnormality of function in spite of the focal emphysema. When, as happens occasionally, a person with evidence of severe emphysema is seen at this stage, a non-industrial or spontaneous origin of the emphysema must be strongly considered."

This second edition, for such it is, contains several hundred more pages than the first, but is about one-third less in size. That was achieved through some magic of the publishing art. For that relief in poundage, blessings upon the publishers.

Citizens of the Community

THE PRACTICE OF SANITATION: EDWARD SCOTT HOPKINS and WILMER HENRY SCHULZE. The Williams & Wilkins Company, Baltimore, 1954, pp. 466, $8.00.

The hard-bitten book reviewer is not noted for restraint in pointing out sins of omission and commission in any scientific text. In the present instance, the writer of the foreword, Dr. Abel Wolman, forestalls any unfavorable appraisal in this language, "One can but admire the courage and the diligence of an author who assumes such a task of wide coverage and complexity. That he succeeds is a tribute to his energy and patience. That he pays a necessary penalty in failing to provide detailed information on every feature of environmental sanitation was to be expected. To accomplish this would require a library of textbooks."

Although this book provides a chapter on "Industrial Sanitation," it is, by intent, perfunctory and constitutes no adequate presentation of industrial hygiene. Yet, it is not without value for the occupational health professions. The chief value is for that rapidly growing number of industrial enterprises operating in remote areas and notably in foreign lands. At all times industry is a citizen of some community and unfailingly community obliga-

tions and responsibilities exist. In the case of industry in remote communities, these responsibilities become notable. It is not an occurrence of high rarity that occupational health is far better served by righting neglected community health than by activities in the industrial plant itself. Therein is the major opportunity of this book to aid industry and industrial medicine.

Engineering in Medicine

THE CALCULATION OF INDUSTRIAL DISABILITIES OF THE EXTREMITIES: CARL O. RICE, Charles C. Thomas, Publisher, Springfield, Illinois, pp. 289, $10.50.

This author reduces the appraisal of industrial disability of the extremities to engineering precision. Heretofore sound estimates of the degree of disability following injury have been limited to well experienced orthopedic surgeons gifted with little erring judgment. This ability only slowly is acquired and only with difficulty is imparted to others. The usual industrial physician has been taught little as to objective valuations of disability after extremity injury. The volume of such work rarely is sufficient to provide good judgment. It follows that scarcely is it proper to undertake such decisions. Then along comes this book with all its exactness to the end that wide experience and infallable judgment no longer are requisites. Any physician may apply the content of this book in any situation within its coverage and arrive upon an acceptable conclusion. The author stakes his methods upon motion and function. Further, he appraises any damaged unit in an extremity in relation to the impairment of the total extremity.

This damaged thumb in itself is not an entity. Instead, consideration must be extended to the thumb in relation to the whole hand, the wrist, the arm, the body totalis. This writer well knows that a 40% disability of an index finger is far more significant to a violinist than to a gravedigger. All that he leaves to others. He stops when he has recorded the 40% loss in function.

The physiologic functional loss is the same. A 100% loss of function of an arm is to the author no less loss than that arm amputated at the shoulder joint. He admits certain cosmetic values in a functionally useless arm and some other values in the retained sensory capacities. Yet for appraisal purposes the arm is gone. Endless psychogenic difficulties may follow extremity impairment, all of which the author grants but declines to explore. Rigidly he sticks to the assignment of determining the quality and quantity of the damage to the tool itself, not the byway injury or the aftermaths. This physician is a first rate engineer. A little later when the word gets around, this book is going to occupy a fully deserved place in the library of a great many industrial physicians.

Women Workers

HANDBOOK OF FACTS ON WOMEN WORKERS. Bulletin No. 242, Women's Bureau, U.S. Department of Labor, Washington, D.C., pp. 121, 30 cents.

Highlights on women in the labor force (April, 1952): Number—about 19 million. This is one-third of all women 14 and over. Thirty percent of the labor force are women.

Occupation—about half are clerical workers or operatives. Over one-fifth are service workers. One-tenth are professional or technical workers.

Age—half are 37 years of age or older. Forty-five percent are under 35 years. Thirteen percent are 55 or older.

Marital status (April, 1951)—of all single women, half are in the labor force. Of all married women, 27% are in the labor force. Over half the women in the labor force are married. About 25% of all women workers have children under 18.

Discussional in Ann Arbor

THE SIXTH Annual Industrial Medical Discussion was conducted at the University of Michigan at the Medical School and School of Public Health on January 7 and 8, 1955. Thirty-seven industrial physicians, chiefly Medical Directors for large manufacturing establishments, met with the Ann Arbor medical and public health faculties for anticipation of newness that might be expected to arise in industrial health programs during the year just started.

These Discussionals are on a invitational basis to small groups in order to facilitate free discussion. Through design, no records are kept, no fixed program prepared, and no manuscripts written or expected. This informal discussion over some years of experience has proved far more effective than formalized programs in the appraisal of trends in occupational health. Although every effort is made to keep the discussions on a spontaneous basis, those in charge do indicate general topics believed to warrant appraisal; however every individual in attendance is invited to present any item of perplexity.

While no report may be made as to what was said, it is proper to indicate some of the topics that came under consideration. These included: The frequency of occupational cancer at this period, including lung cancer; and the present tendency to revert to the use of some chemicals long proscribed for some operations on the grounds of hazardous exposure. It is anticipated that improved facilities for industrial hygienic protection justified the restoration of dangerous materials into these operations. Still further, discussion was directed to procedures now under way connected with plant certification and medical specialty certification. One session was devoted to the rise of union health centers and other activities and the impact of all such programs upon conventional occupational health services conducted on the plant premises. Another session was keyed to the appraisal of industrial soaps and other detergents as sources of dermatitis. It was surmised that much dermatitis accepted as of occupational origin rightfully was produced by causes apart from the work premises. A final session was directed to the ways and means of detecting workers with sensitive hearing apparatus who, when employed in noisy areas, might become deafened. Earlier presentations indicated that it is now practical to keep out of noisy exposures workers likely to be damaged by noise and conversely to employ only those little susceptible to noise damage.

During this Discussional, Dr. Paul F. Orr, of Toledo, not a member of the Discussional, presented to Dr. Clarence D. Selby, a member of the faculty of the School of Public Health and Consultant, Institute of Industrial Health, a medal commemorating his past-presidency of the Ohio State Medical Society.

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Boxing Fatalities in 1954

UNDER the caption "The Nation's Most Dangerous Trade—Professional Boxing" in December, 1951, this Journal published an editorial which widely was quoted and reprinted. It could be assumed in case of some amelioration of that ugly situation that that editorial exerted an influence. Be the facts as they may, any real credit accrues to the late Dr. Frank Ferlaino whose demands for safety in the boxing ring were unremitting. His activities brought to him more loss of prestige than fame in the hierarchy of pugilism, but never was he swerved from his dedicated purpose.

Happily but belatedly betterment has come about. The fatalities for 1954 are few—only six for both professional and amateur boxers, a drop from 22 for the previous 1953 and the lowest number since 1945. This is the story direct from the boxing world as now quoted:

"The records, compiled by *Ring Magazine*, were disclosed today by editor Nat Fleischer. The six fatalities were evenly divided among the professionals and the amateurs. Four of the deaths occurred in the U.S. and two abroad. There wasn't a pro death until November 30 when English welterweight Bobby Callaghan died in London a day after he fought a six-round draw. Ralph Weiser, a Portland, Oregon, lightweight, succumbed after a knockout defeat at Klamath Falls, Oregon, December 11, and Ed Sanders, Olympic heavyweight champion of 1952, died a day after he was knocked out in Boston, December 12. The amateur victims were Police Constable Vaipou Ainu'u, 35, at Samoa, February 18; Airman Jesse J. Hylton, 22, at Oakland, California, and Aviation Ordinanceman M. G. Byrd, 22, at Pensacola, Florida, September 9.

"Fleischer attributed the fatality drop to increased safety measures introduced by the New York State Athletic Commission and followed by other states. The New York Commission, Fleischer said, adopted many of the safety precautions introduced first in Cuba and Italy.

"Tracing world deaths in the ring since 1900, Fleischer said that in the 54 years, 327 boxers died during that period during which 300,000 boxers competed. Referring to the six deaths in 1954, Fleischer said 'This low number is phenomenal. It is considerably less than the fatalities suffered on the football field or in automobile racing. New York has led all the way with a new type mat, special blood tests, head examinations, suspensions of those who are knocked out, half-yearly examinations of all licensed boxers, and physical tests twice before a bout. Closer cooperation among the state commissions, with working agreements making it impossible for suspended boxers who are physically unfit to perform in one region when barred in another, has helped considerably to reduce ring fatalities and injuries to the low level reached in 1954.'"

No mention was made of Dr. Frank Ferlaino, but there he stands!

The Obese Industrial Worker

WHY DO people get fat? Almost solely because they overeat. Why do people overeat? Chiefly because they are hungry. Why are many apparently well-fed persons hungry? Partly because of low blood sugars—hypoglycemia—or at least the improper metabolism of sugars. The overworked and somewhat commercialized dictum "eat and grow thin" may have more than a

modicum of merit. It appears to have been established that a judicious intake of carbohydrates may so abate hunger that the gastric motion that induces hunger sensation may be averted with the consequence that overeating does not arise.

All these statements may represent oversimplification in summarizing elaborate investigative work now under way at the School of Public Health of Harvard University. Were these investigators speaking for themselves their emphasis would be directed to the degree of glucose utilization rather than to the determined level of blood glucose. In fine, a little of proper food at the proper time may stave off excessive consumption of food in response to the impulses of hunger.

Second Careers

SOMETHING uncalculated has happened to the well-made plans of the retirement planners. Enforced retirement at the age of 65 accompanied by funds from pensions sufficient to provide for further years with accent on leisure was presumed to create a new and growing portion of the population—the unworking retirees. This was no prospective privileged set as represented by the banker, the English professor, or the government officer. By the tens of thousands factory workers—including that honorable group, "laborers"—were eased out of their long employments, assured of enough income to get by, but no opulence, and ushered into the beneficence of leisure. Even the Federal government imposed a penalty against continued work anywhere by withholding old age benefits from those ambitious and energetic ones who insisted upon more income from work beyond a pittance. That one error partly has been erased by the 1954 enactment that permits as much as $1,200 earned income annually without loss of Social Security benefits.

All the nice plans have backfired. The "retirees" want to work, and are working, from janitors to college presidents. Now it has come to light that of all who have been forced to retire, only 5% of those who were well did so willingly merely to enter a life of leisure. The fantasy of a new leisure class never became a reality. The rocking chair is unused; the much-talked-about "fishing" became a bore; the do-it-yourself machinery in the basement lost its appeal. The honest, healthy, American adult, man or woman, at all ages wants to work. At 68 and 74 he still is working. Nor is he averse to the *quid pro quo*.

The emphasis is on new careers in employment rather than on business ventures. Within the period of widespread old age pensions, more than two million new enterprises have folded within two years of hopeful prospects at their inception. The shining example of a new career in the top drawer area is what happened to Dr. Benjamin Duggar, retired by compulsion of age as a Professor of Botany at the University of Wisconsin. Promptly he carried his store of knowledge into private industry and discovered aureomycin, outstanding in the galaxy of the antibiotic drugs. That quality of genius is not sufficient to go around, so in a lower drawer look approvingly upon Arlyle Porter, forced to retire as a school teacher. Discontented with idleness and none too happy with her scanty pension money, she set about the hand painting of neckties. Even without their being of nude women, or handsome legs, or overly large mammary organs, the demand outruns the painted tie rack, and Arlyle snaps her nimble fingers at the poorly paid school teachers who still ring the bell dismissing their squirmy charges at 4:00 every weekday afternoon.

FOR MANY, the compulsory but unwanted retirement at 65 has proved an unexpected boon—more money than ever before and far more satisfaction. Some of these new careers bear no resemblance to the erstwhile employments. New skills are developed and applied. All this keeps the new leisure class in the state of theory. Always there will be some who espouse the preferred leisure, some who never worked much at any time, some who merely are dabblers in continued work.

More importantly, and entitled to the fullest consideration, are those whose accumulated years make all further work impossible. Let that increasing and mounting number constitute the citizens of this well-provided and earned leisure. But for the hearties of 65 and 70, has not a grevious mistake been made? Would not their earlier well-developed skills better serve in the majority of instances right in the industries from which they were extruded? Toward righting a million-man wrong, is it not indicated that some new scrutiny attend this business of enforced retirement at 65? Should not workers be retired when there is substantial reason for retirement? If retirement is to be uniform and compulsory, does not the age 70 better speak its merits than 65? Oftentimes, is not this practice of compulsory retirement at 65 but a convenient contrivance for getting rid of numerous dottery old employees who better should have retired for reason at 60 or even 55? Is not a wicked penalty imposed upon the many hale productive ones in offering them as a pious sacrifice to uniformity?

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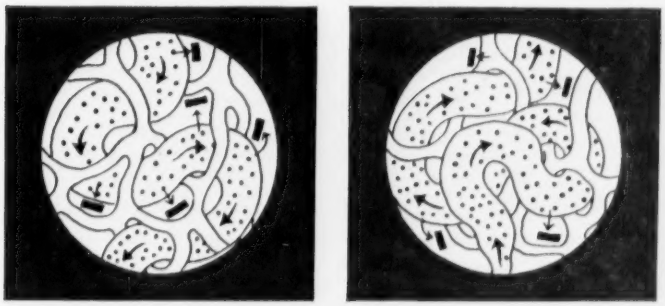

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CONVENIENT SANITARY ECONOMICAL

FOR INDUSTRIAL USE

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News, Comment, Opinion

FROM the standpoint of social welfare, there should be a greater concentration upon developmental diagnosis to be able to make a real appraisal of normality.

—"Keeping Up With Medicine," in *Ohio State Med. J.*, December, 1954.

Solved

REP. GROSS (R., Ia.) thinks he has solved the "filter" problem for the cigarette makers. He would make a filter with a mouse in it. When the mouse got cancer, he would throw it away and get a new mouse.

—WALTER TROHAN, in *Chicago Tribune*, December 11, 1954.

Skills

SKILLED and semi-skilled workers in the U.S. are increasing in numbers; the unskilled are decreasing. The number of skilled jumped from 6,200,000 in 1930 to 7,900,000 in 1950, and the semi-skilled from 5,500,000 to 8,600,000. The unskilled decreased from 6,100,000 to 3,600,000 in the same period.

New Journal

NOISE CONTROL" is to be the new Journal of the Acoustical Society of America. It will be designed for the reader who has practical noise problems. The Acoustical Society of America has, among its members, some 500 experts in the field of noise control.

Traumatic Cancer

ELLENBOGEN, in *J. Med. Soc. New Jersey*, June, 1954: Cancer as the result of a single trauma is rare, but well authenticated cases have been reported. Segond's postulates have been accepted widely by courts and by oncologists. They are: (1) the authenticity of trauma to the part must be established definitely; (2) the trauma must be a significant one; (3) there must be reasonable evidence of the integrity of the part prior to the injury; (4) the site of the tumor must correspond to the site of the injury; (5) the date of the appearance of the tumor must not be too remote from the time of the accident to be associated reasonably with it; (6) the diagnosis of the tumor must be established by clinical roentgen, and whenever possible, microscopic evidence.

—*Arizona Med.*, December, 1954.

Saw It Coming

OMINOUS public pronouncements by pessimistic observers of the American scene are actually nothing new; in fact, viewing with alarm is an old—if somewhat discredited—U.S. custom. As evidence, consider these historical specimens of the limp upper lip, unearthed recently by *The Controller*:

"All is darkness and despair. As a nation we are at the bottom of the hill" (*Detroit Free Press*, 1837).

"Nothing in this country is safe, solvent or reliable" (*Philadelphia Gazette*, 1857).

"Collapse is a grim reality. The days of the Republic are numbered" (*New York World*, 1873).

"On every hand there is depression, wreck and ruin. We can't go much farther" (*New Orleans Picayune*, 1893).

"The old ship of state is sinking. Even Morgan is using the subway" (*Wall Street Journal*, 1907).

—*Management Review*, December, 1954.

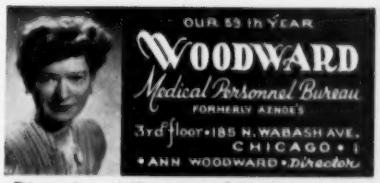
Your Concentration?

PEOPLE tire themselves out by pushing themselves to the limit of their concentration space, observes Dr. Walter Woodward, industrial psychiatrist with the American Cyanamid Company. Most people can concentrate on what they are doing for about two hours before attention begins to wander. It takes quite a while for his mental energy to recover, and meanwhile the individual is frustrated because he can't get on effectively with his work. Dr. Woodward suggests that if concentration is limited to about 50 minutes, with a 10-minute break following, it is possible to repeat this 50-and-10 schedule four times without getting tired. This routine actually doubles the normal concentration span without imposing the penalty of great fatigue and inability to work. It isn't necessary to leave your desk. A change of pace is all that's needed.

—From *Supervisor's Personnel Newsletter*, Bureau of Business Practice, quoted in Connecticut General's *Notes & Quotes*, December, 1954.

Carcinogenesis

CARCINOGENIC substances incidental to industrial procedures represent a hazard both to those



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Medical Director: (a) Internist, Diplomate, American Board, Internal Medicine, FACP; Past five years, Medical Director, leading company with 32,000 employees. Strong leader; early forties. Recommended.

Medical Director: (b) 36; Class "A" graduate; four years, private general practice and, also, Medical Director, major company, semi-heavy metal fabricating industry; currently, Medical Director, life insurance company; prefers Medical Directorship in industry.

Chief Physician: (c) 39; M.D., Hahnemann Medical College; five years, private general group practice; past year, medical supervisor, large electrical manufacturing company; seeks more responsibility; prefers Ohio but will consider other localities.

Staff: (d) 32; single; M.D., University of Pennsylvania, Medical; years rotating internship; years residency, internal medicine; one year, medical officer, large industrial medical facility; seeks industrial medicine or industrial hygiene.

Physician: (e) 36; M.D., Cincinnati Medical; trained internal medicine, university hospital; four years successful private practice plus duties as plant physician. Several years, Medical Director, medium sized plant; seeks Medical Directorship or staff position in large company for economic reasons; now earning about $15,000; prefers Ohio, Indiana, Michigan; extremely well-qualified man for assistantship in multiple-plant operation; excellent recommendations.

SITUATIONS OPEN

Medical Director: (f) Large Company in Boston area; must be qualified to supervise medical staff of 20.

Medical Director: (g) Major company, semi-heavy metal fabricating industry; large city; Midwest.

Medical Director: (h) Associate; new post; new regional offices; one of major insurance companies; Midwest.

Medical Director: (i) Assistant; preferably internist; major company; 4000 employees; opportunity advance; Philadelphia area.

Medical Director: (j) Assistant; Insurance company; requires one trained in traumatic surgery; Bay area; California.

Staff: (k) major company; should become assistant medical director, short time; $10,000; near Buffalo.

Staff: (l) Mining company; opportunity private practice; $12-$13,000; free maintenance including home; West.

Staff: (m) With at least two years industrial experience; major company; one of finest industrial departments; university town 300,000; Mideast.

Staff: (n) AEC program, long tenure; brand new, well-equipped medical departments; leading company; about $10,000; university city 500,000; Midwest.

Staff: (o) Recent graduates interested in industrial medicine as career; two required; program directed toward giving applicant basic experience in industrial medicine; outstanding department of major company; large city; university medical center.

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occupationally exposed and to the population in general. The potential carcinogenic materials may be classified on the basis of their nature, their environmental site, and the target tissues responding to them. Their natural state may be chemical, physical, or biological. Their environmental site may be in the atmosphere, in the soil, or in the water. The tissues responding to them may be at the site of initial contact or in organs or organ systems concerned with their metabolic and eliminative processes. The control of these environmental factors seems entirely practical on the basis of current industrial hygiene and toxicologic practices. An awareness on the part of industrial physicians is the necessary starting point for the protection of those environmentally exposed.

—Author's Summary, "Environmental Factors of Occupational Origin Related to Carcinogenesis," by IAN MACDONALD, M.D., Los Angeles, in *J.A.M.A.*, January 1, 1955.

Executive Health

EXECUTIVES are no more prone to ulcers or coronary disease than others in the same age group, according to DR. E. P. LUONGO, Medical Director of the General Petroleum Corporation, Los Angeles, which has had for some time a comprehensive system of regular physical examinations for all employees. Writing in the November issue of *Petroleum Refiner*, DR. LUONGO suggests that there is a growing tendency today to overemphasize the health problem of executives. He also thinks there is a tendency to overestimate the number of employees of any rank who need psychiatric services. "Only a small percentage," he says, "are candidates for formal psychologic evaluation, and an even smaller group for psychiatric evaluation." From 85 to 90%, he believes, can find solutions to their emotional problems through supervisors, family, friends, clergymen, etc.

—*Industrial Relations News*, November 27, 1954, quoted in *Management Review*, January, 1955.

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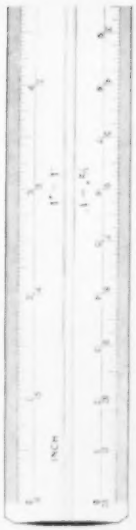
Absenteeism Survey

TO OBTAIN usable data on normal absence levels and methods of controlling absenteeism, the Merchants and Manufacturers Association of Los Angeles recently conducted a survey which is believed to be the largest of its type ever conducted in a single community. Cooperation was obtained from 219 firms employing over 109,000 people in the Los Angeles metropolitan area. These companies ranged in size from 20 to over 30,000 employees. Participants from retail and wholesale trade; banking, insurance and finance; privately owned utilities; service industries; and each of the major manufacturing classifications were included in the survey. Participating firms were asked to keep a daily record of absences for a one-month period and to provide information on methods used to control absenteeism in their own companies. Absences included in the count were those in excess of four hours in any one day, authorized or unauthorized. Specifically excluded were those of less than four hours; absences due to industrial accidents; authorized leaves of absence and vacations. A number of authorities in the industrial relations field have expressed the view that absenteeism probably runs around 6% of all working time na-



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tionally. Against this, the results of the Los Angeles survey indicate an over-all absentee rate of 2.8% for the month studied. Eliminating exempt salaried employees (managerial, professional and technical) from the calculation, the rate is an even 3%. Absentee rates for night shifts were generally higher than for the day shift, the "graveyard" shift showing the poorest record. This general pattern holds true for both male and female employees, and for hourly paid as well as non-exempt salaried employees. With few exceptions, the absentee rates of office employees (non-exempt) were lower than for shop (hourly) employees, and managerial, professional and technical personnel (exempt) had the best record among the three groups. Supporting the generally accepted assumption, absence rates among female employees were generally higher than among males. Generally, absence rates for non-manufacturing firms were somewhat lower than in manufacturing. Confirming the results of other, smaller studies, the M & M survey shows Monday to be the day of most frequent absences (3.3%). Wednesday and Thursday, with rates of 2.6%, show the best records. Employers providing sick pay were found to have a slightly higher average absentee rate (3.1%) than those that did not have sick pay (2.8%). The survey period chosen included a holiday, so that the effects of company policies requiring attendance before and after the holiday in order to be paid for the holiday could be measured. The validity of this practice was supported by the survey results, which showed a 1.9% absentee rate on the day before the holiday for those firms requiring employee attendance on that day in order to receive holiday pay, as compared with a 2.3% rate for those not having this requirement. Consistent with this is the absence rate of 2.0% on the day after the holiday for those requiring work on that day, versus 3.6% for the other firms. Although the absence level among firms employing 1,000 or more persons (3.2%), was slightly higher than the general average (3.0%), several of the largest participating firms had rates well below the average. One large banking institution recorded a 1.7% absentee rate for the survey month. Another commonly held idea is that the longer the work week, the higher the absence rate. The survey findings fail to support this view: Average absenteeism rate in companies with a work week of more than 40 hours was 2.9%, as against 3.0% for firms having a work week of 40 hours or less. In connection with the work week, it should be noted that very few schedules call for work in excess of 48 hours. Several studies in England and the United States have shown that extended work weeks, followed over a long period of time, do produce excessive industrial fatigue, a decrease in productivity, and an increase in absenteeism.

—*M. & M. Survey Analysis*, quoted in *Management Review*, November, 1954.

They're Human, Too

As an old enemy of the frauds perpetrated in the name of psychiatry, I was slightly delighted to read a news story con-

cerning a psychiatrist. The man is quoted as saying that a failure of eight members of the profession to agree on a particular point "practically invalidates psychoanalytic interpretation as a trustworthy scientific procedure." This would be Dr. Thomas French, Associate Director of the Chicago Institute of Psychoanalysis, reporting on an experiment in which patients' personality difficulties caused various physical disabilities such as ulcers, high blood pressure, thyroid malfunction, and skin ailments. None of the experts could agree on what really caused the trouble. Dr. French made a tough additional statement to the effect that psychoanalysts had fallen into "very uncritical and irresponsible habits in interpreting their patients' emotional symptoms." The No. 1 conclusion reached was that since a psychiatrist is a human being with his own personal bias and special personality, he cannot possibly be an inflexible measuring instrument of other folks' frailties. I could have told the kids this simple fact years ago, and, as a matter of fact, did. There are a lot of old tired basics lying handy. One is that a nervous nation has sought an excuse for its nerves and, in seeking the excuse, has looked for somebody to provide the crutch. The voodoo doctors served admirably. They flattered the ego, and listened to the confessions—and everybody likes to confess if he can brag a little—and so came to be considered scientists. When you consider that I know one highly skilled soul prober whose wife left him to be near her dog, who lived in another city, and he was able to justify the departure, then I should not go to him in any great trust as an adviser for my own problems. He would say that she had a deep-seated impulse to desert her father's memory for the symbol of the new life as exemplified by the dog. I would say that she didn't care much for either her husband or the city she was living in, and simply took off. I would leave her old man out of it. I know one man who has been to the psychiatrists, all of whom are frustrated authors, to find out why he cannot write a book. They have told him various things most of which go back to early insecurities, mama fetishes and a preoccupation with his sister's red sleigh. I would tell the man that you cannot write a book unless you get some paper and a pencil or a typewriter and sit down and write. It is possible that a man who is lost can find his way again if he gets solid counsel, but this function has been performed by priests and rabbis for a great many years—the psychiatrists only recently muscled into the racket.

—Robert C. Ruark, in *Chicago Daily News*.

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- Contact Dermatitis IS THE MOST FREQUENTLY ENCOUNTERED OF ALL DERMATOLOGICAL DISORDERS.
- THE OBJECT OF THERAPY IS TO SOOTHE AN ALREADY IRRITATED SKIN. DO NOT OVERTREAT.
- THERE ARE NO CUTANEOUS CONTRAINDICATIONS TO BATHS, SOAKS OR WET DRESSINGS. MAKE USE OF THEM.
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"The Mountain Labored . . . ."

Recently, nine men met in the Palais des Nations in Geneva, Switzerland. These constituted a committee for joint action by ILO and WHO. Four were union officials—three from London and one from Norway. Four were high ranking public health officials—one each from India, Norway, the United States, and France. The ninth was a Professor Emeritus of Public Health from Liverpool. This joint ILO-WHO committee deliberated for three days. The conclusions they

reached were published in a news release from WHO as follows: "(1) Medical advice by radio should be available to ships at sea at any hour of day or night. (2) Every ship should carry a medicine chest containing a recommended assortment of medicaments based on the International Pharmacopeia. (3) All new entrants to the Merchant Navy should be examined for tuberculosis." If a committee of doctors of medicine chosen at random from Nebraska, Iowa, or from any other state in the Union could not have accomplished this simple bit of work without leaving their home-lots, it would be shocking. Yet we, the taxpayers of the U.S.A., pay one third of the cost of this and other similar junkets. We not only pay one third for WHO but are stuck, also, for ILO by way of the United Nations.

—From an Editorial in *Nebraska Med. J.*, January, 1955.

"Dragged Their Feet"

SOME workers just won't pay attention to a "company doctor." Pennsylvania Railroad physicians told the Annual Meeting of the Industrial Hygiene Foundation "an appreciable number" of employees ignore medical advice. Drs. Edward J. Whalen and William M. Woodward checked up on 100 "representative cases" in which they found something wrong with a worker that they thought justified further medical attention on the outside. In 21 cases—more than one out of five—the doctors reported, the employees either refused to take heed or delayed action. And in 11 cases, the report disclosed, the workers' own physicians dragged their feet. Also the doctors declared, the industrial physician must: (1) Find better ways to get his story across to the employee. (2) Follow up to see that the worker is doing what he was told to do. (3) Develop closer relations with the outside doctors and supply them with detailed reports of medical examinations conducted by the company. (4) See that workers have "satisfactory health insurance" protection so they won't delay seeking outside medical help because of the expense involved.

—*Pittsburgh Press*, November 17, 1954.

Young Workers

YOUNG PERSONS lose more time from work because of illness than do older men and women, according to a recent survey among employees of E. I. du Pont de Nemours & Company. In the 24-29 age bracket, 55% of all employees had a time-losing illness last year. Among those in the 36-40 bracket, only 33% had lost time, while in the 55-60 bracket it was 49%. In all groups, most missed less than a week. A typical family of four spends about $300 a year on medical bills, including insurance, Du Pont finds. This sum is bolstered by the health services and protection which the company provides each employee. Medicine and drugs cost an average of $76 for employees who kept records of what they spent. According to the survey, 54% of the employees missed no time last year because of illness, while 27% missed less than a week. Only 2% missed as much as four weeks. Even at age 40 and over, 56% had no time-losing illness.

—*National Safety News*, November, 1954, quoted in *Management Review*, January, 1955.

General Motors

GENERAL MOTORS maintains 125 completely equipped medical departments in its plants in the United States and Canada to promote health and safety of almost 500,000 employees. These departments are staffed by a total of more than 1,000 physicians, registered nurses, and technicians. "Our staff performs millions of physical examinations annually," Dr. Max R. Burnell, Medical Director of General Motors, explains. "Each new employee is given a preplacement examination, and thereafter received periodical examinations. These examinations have far-reaching effects. They provide a great opportunity for early recognition of ailments of which employees may be unaware. In such cases we of course refer our people to their own physicians for treatment. We feel that this is an important step in the field of preventive medicine. We cooperate with the community health officers in reporting contagious disease. We stress in employee publications the importance of annual physical check-ups. As a result of these admonitions and their own check-ups by our medical people, many of our employees have made it a rule that members of their families be annually examined by their personal physicians. We believe that our program and the influence resulting from it plays a major role in the

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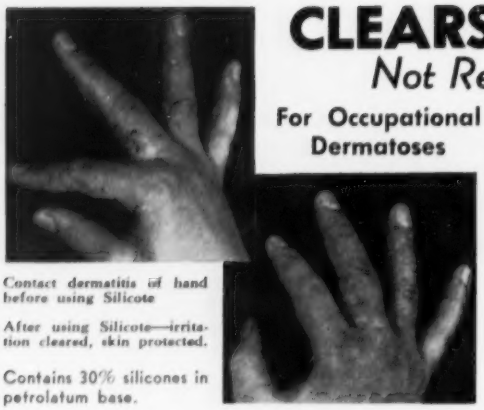

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1. Talbot, J.R. et al: J. Inv. Derm. 17:125
2. Morrow, Grant: Calif. Med. 80:21

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—*Trenton, New Jersey, Trentonian,* November 23, 1954.

It Happened in '54

THE British Medical Association was told that men who snore do so because of atavistic impulses dating from prehistoric times when males made noises at night to keep marauders from their caves. . . . A New York arbitrator held that it is impermissible to fire a waiter because he is writing a book about the customers and restaurant owner. The New Jersey Supreme Court decided that a bartender hit by flying beer steins can collect workmen's compensation. An ordinance in Waterloo, Nebraska, forbade barbers to eat onions between 7:00 A.M. and 7:00 P.M. The New Jersey Supreme Court also found that a night watchman can collect overtime even when asleep on the job. Australian tribunals held that compensation was proper in a case of dislocated jaw suffered while yawning at work.

—*Chicago Tribune,* December 31, 1954.

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Bakelite Co.	Mathiason Tankers
Campbell Soup	Merck & Company
Chase Brass & Copper	Mergenthaler Linotype
Chemstrand	National Gypsum
Central Maine Power	National Lead
Celanese Corp.	North Am. Aircraft
Ciba Pharmaceutical	Norwich Pharmacal
Continental Oil	Personal Products
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Eastman Kodak	Rheingold Breweries
Elastic Stop Nut	Richfield Oil
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Esso Standard Oil	Socony Paint
Flour Corp.	Studebaker
Ford Motor Co.	Sun Oil
General Electric	Union Carbide & Carbon
General Motors	United States Lines
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IT SHOULD BE!

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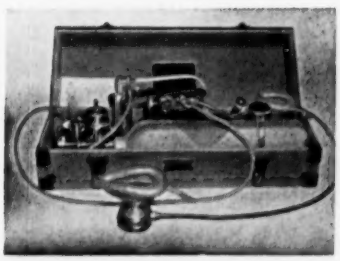

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Federal Employees' Program

AN INTERESTING aspect of the Federal government's expenditures in the health field is the operation of a Federal employees' health program under which certain Federal agencies are authorized to operate health clinics to provide limited health service to Federal workers. The program, authorized nearly 10 years ago, is designed to minimize illness and assist workers in remaining on the job. Health services include treatment of on-the-job illnesses by a physician or nurse, pre-employment and fitness-for-duty examinations, and treatment for illnesses or conditions for which a worker is under the care of a private physician who, in turn, requests treatment for the patient at the Federal clinic.

—*Wisconsin Med. J.*, December, 1954.

Be Absent—Save Time

AN OFFICE worker reported to the company nurse that she had a cold. Although her temperature was normal the nurse advised her to go home. The nurse did not believe that, under the circumstances, she could insist that the girl's supervisor permit her to leave. The supervisor was under the pressure of a tremendous workload and wanted the girl to remain. She did, but later was out of work three days. Within a week nearly every other person in that department had a cold and most of them were out for at least one day. Work in the office piled up more than it had before. The supervisor now insists that any employee who appears to be spreading a cold, go home. Time is saved in the long run.

—From "Health Maintenance for Greater Efficiency," Small Business Administration Series No. 16.

Executive Examinations

WHO conducts executive health examinations? Many companies use their own Medical Departments or company physicians. Others have their key men go to outside clinics—Philadelphia's Benjamin Franklin Clinic, Boston's Lahey Clinic, New York's Life Extension Institute, Detroit's Henry Ford Hospital, Rochester's Mayo Clinic, and similar organizations. In some companies executives may select their own medical examiners, provided the choice is acceptable to the director of the company's health service. Whatever the arrangements are, most programs have several

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Industrial Surgeon: (SK-155) Certified in Surgery. Particularly interested in industrial surgery especially in administrative and consulting phases; M.D., Jefferson Medical College; five years private practice of general surgery; two years experience as industrial physician; age, 35.

Medical Director: (CG-155) Has been Medical Director of large manufacturing company in Middle West for past 18 years. Excellent medical background and training, particularly in all phases of industrial medicine; wants something in warmer climate; age, 50.

Industrial Physician: (B-155) Five years experience as physician and surgeon for large manufacturing company; has set up and supervised several health programs, both in industry and public health; has specialized in general, traumatic and orthopedic surgery; age, 53.

Industrial Physician: (JP-155) Four years experience as industrial physician and surgeon; has specialized in occupational medicine; M.D., University of Oklahoma School of Medicine; Excellent references; age, 34.

Industrial Physician: (HL-155) M.D., University of Cincinnati School of Medicine; has specialized in industrial medicine and is eligible for boards; two years experience as assistant to Medical Director of large company; age, 32.

Medical Director: (RM-155) Five years Medical Director of manufacturing company; M.D., University of Iowa Medical School; has specialized in Industrial Medicine; post-graduate courses in x-ray and cardiology; outstanding administrator; age, 40.

Industrial Physician: (RD-155) M.D., University of Louisville Medical School; 15 years in own general practice; handled industrial work for several manufacturing firms in conjunction with his practice; well regarded by all professional references; age, 52.

Medical Director: (AL-155) Certified in Internal Medicine; six years experience in industrial medicine and public health; is at present Medical Director of an industrial health council which entails considerable administrative work; will go anywhere; age, 35.

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things in common: *Most programs are voluntary.* Executives are, of course, urged to participate and are informed of the value of thorough periodic examinations. *Examinations are thorough.* They include a history, physical examination, electrocardiogram, chest x-ray, and a series of blood and other laboratory tests. Special studies are usually made when findings indicate the need for diagnostic procedures that are not ordinarily included in the examination. The time required varies from several hours to several days, depending upon the extent of the examination and the executive's condition. *The company pays the examination fee.* Payment is made only for diagnosis, but the total fee may vary with patients' needs. The examining physician offers the executive advice on changes in his living habits that would be beneficial to his health and refers him to his own physician for treatment if that is indicated by the examination results. The findings of the examination are reported to the executive's personal physician. *Results are confidential.* Reports are made only to the executive and to his personal physician. They are not released to another company official without the patient's consent. In most companies the responsibility for following through with medical recommendations rests with the executive himself. *Frequency of examination varies.* The most common pattern is one of annual examinations. The plans, which vary with age, usually offer more frequent examinations to older executives or to those executives with conditions which seem to warrant check-ups more frequently.

—From Metropolitan Life Insurance Company's Occupational Health Series No. 7.

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ELASTICFOAM is a completely new type of bandage which combines the best properties of adhesive plaster, elastic, and cotton bandages. It is made by permanently bonding a sheet of multi-slit foam rubber to a superior quality cotton elastic bandage.

ELASTICFOAM stays in place like adhesive plaster—shaving is eliminated, redressing easy and painless.

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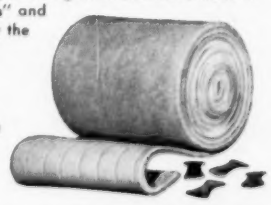

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POWDER IN ENVELOPES OR TABLETS

Dissolve in plain water as directed for preparing antiseptic, astringent Burow's Solution for treatment of Swellings, Inflamations, Sprains • Antipruritic, decongestive action • Accurate uniform dosage • Stable • Lead-free • Accepted by U.S. Army and Navy.

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Each tablet contains 0.05 Gm. Valerian Extract.
Odorless Herbaceous Chocolate coated Tablets

FOR PULMONARY CONDITIONS
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3% solution Quinine with 2½% Camphor for Intramuscular Injection.

STANDARD PHARMACEUTICAL CO., INC., 253 West 26th Street, New York 1, New York

The Corporation's Interest

CORPORATIONS have a direct and practical interest in health. That interest is shown at the front door of industrial plants because, in the great majority of cases, physical examinations are now a preliminary step in the hiring of new employees. The importance of health to production and good employee relations is obvious and there are few corporations of any size which do not have provision for medical care ranging up to elaborate department organizations and connections with hospitals. There is a definite cost of hospitalization and health insurance programs for their employees—and cost is directly related to experience. A step removed from the corporation's interest in health within its organization is its interest in the prevailing condition of health in plant communities. And corporations have a definite interest in the public health of the country as a whole. Of course, they have a human interest, but I am pointing to monetary reasons for monetary support of medical education. On this score I believe it is evident that health is a fundamental factor in our economy and that good health contributes to a good economy and good business. Support of medical education is support of private enterprise. We can be sure that the public would not tolerate a decline in medical education. There would not only be a sanction but a demand for government to step into the picture with subsidies. In other words, a corporation has no real choice of whether or not it will support medical education. The actual choice is whether it will support medical education privately or through taxation. And when government support enters, government control follows. I believe our corporations have a very definite obligation in this matter.

—ERNEST T. WEIR, Chairman of the Board, National Steel Corporation, before a committee meeting of the National Fund for Medical Education, In New York City; quoted in *Dun's Review & Modern Industry*, September, 1954.

The Coal Miners

THE medical and hospital program takes the next largest slice of revenues, nearly $56,500,000 last year. Medical services in the coal region, with a few exceptions, were pitifully inadequate when the fund's medical advisory board undertook its first survey. Decades of neglect had caused almost unbelievable misery. Some miners had been bedridden for 20 years. Many paraplegics, amputees, and arthritics were so weak they had to be sent to local hospitals to build up their strength before they could be given rehabilitation treatment. The fund considers the money well spent if it can enable men to get out of their beds or wheelchairs and rejoin the circle of their families and friends. For many it does much more, providing training for new jobs that make them self-supporting again.

—From "Milestones for Miners," by BEN PEARSE, in *The Nation*, August 28, 1954.

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When . . . abdominal bloating, heavy, tender breasts, puffiness of hands, face, legs, headaches, backache, mental depression, and explosive irritability, appear regularly before menstruation . . . consider premenstrual tension. These symptoms are due to an excess fluid accumulation. Because they are not of psychic origin, they do not respond to the usual sedatives and anti-spasmodics.

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1. Valadier, M.: Indus. Med. & Surg., 22:183, 1953.

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Dose: One tablet q.i.d. starting 5 days before expected onset of menses.

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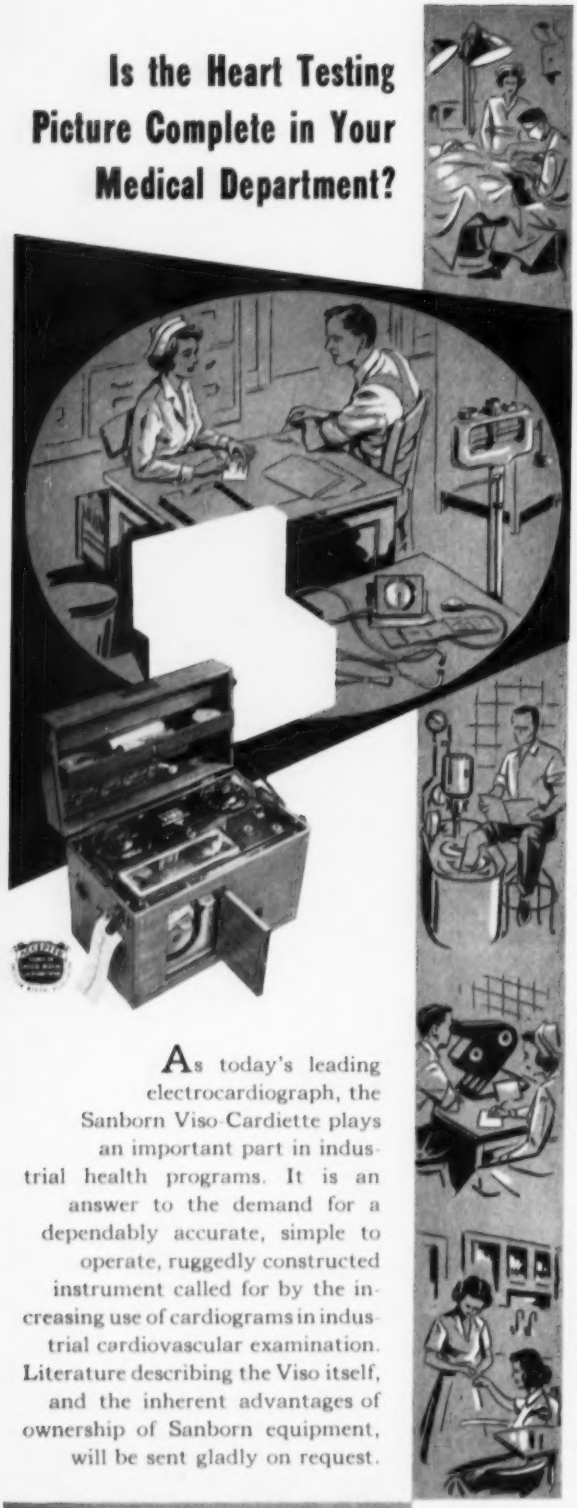

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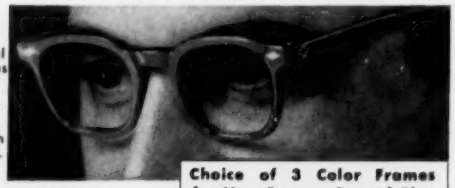

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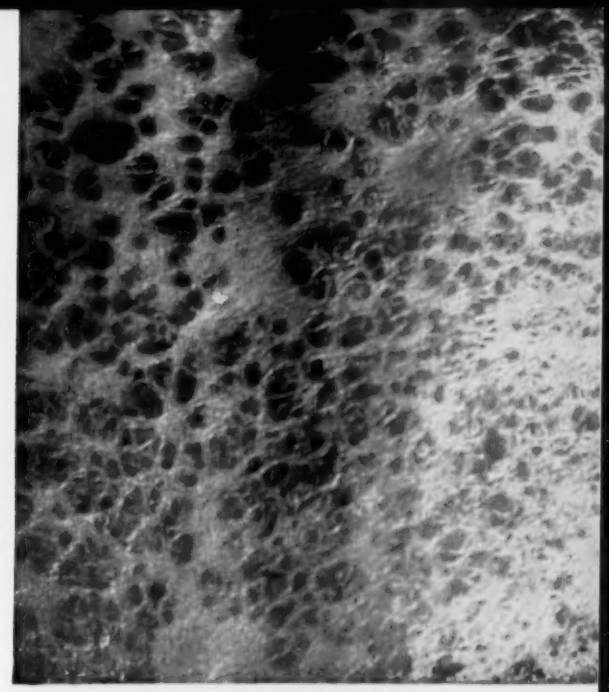

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References: 1. J. Am. Pharm. Assoc., Sc. Ed. 39:21 (Jan.) 1950. 2. Ind. Med. 20:480 (Oct.) 1951. 3. In Press. 4. J.A.M.A. 141:124 (Sept. 10) 1949.

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